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ANNUAL REPORT OF THE
GOVERNOR OF THE
PANAMA CANAL, 1938

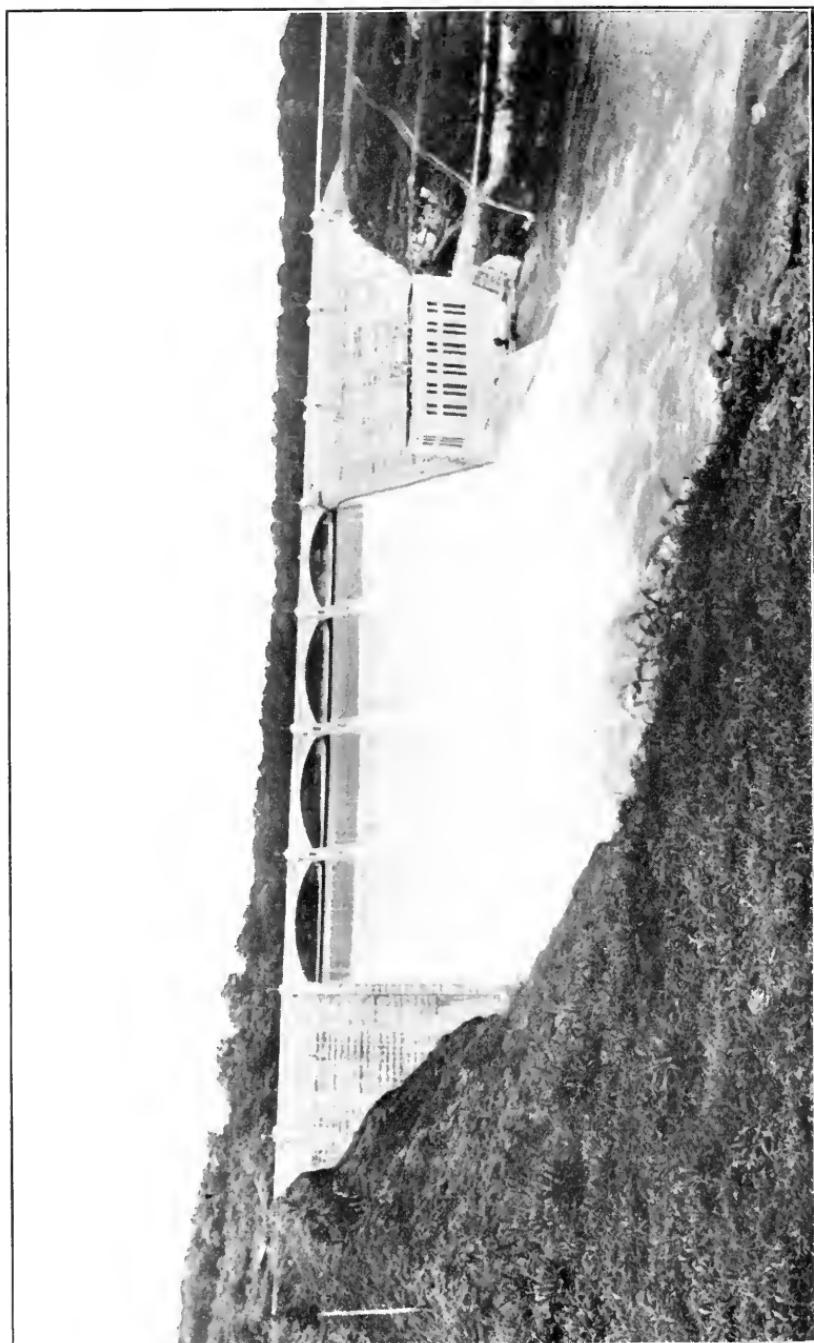
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MADDEN DAM, SPILLWAY, AND POWER STATION. JANUARY 1938.

ANNUAL REPORT
OF THE
GOVERNOR OF
THE PANAMA CANAL
FOR THE
FISCAL YEAR
ENDED JUNE 30
1938



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W.M. BROWN

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REPORTS OF HEADS OF DEPARTMENTS AND DIVISIONS

APPENDICES NOT PRINTED

The material in the annual report of the Governor of The Panama Canal, published in this volume, is to a large extent a summary of the data presented in the annual reports from the heads of departments and divisions in the Canal organization; the latter, regarded as appendixes to the report of the Governor, are not printed. The annual reports of the Panama Railroad Co., and the health department are published separately; the latter is compiled for calendar years only. The reports of the heads of departments and divisions, as listed below, are on file at the Washington office of the Panama Canal or at the office of the Governor at Balboa Heights, Canal Zone:

Engineer of maintenance, report of.

Designing engineer, report of.

Dredging division, report of superintendent.

Plans section, report of chief.

Assistant engineer of maintenance, report of.

Electrical division, report of electrical engineer.

Municipal engineering division, report of municipal engineer.

Locks division, report of superintendent.

Office engineer, report of.

Section of surveys, report of chief.

Marine division, report of marine superintendent.

Mechanical division, report of superintendent.

Supply department, report of chief quartermaster.

Accounting department, report of comptroller.

Executive department:

Division of civil affairs, report of chief.

Police and fire division, report of chief.

Division of schools, report of superintendent.

Bureau of clubs and playgrounds, report of general secretary.

Division of personnel administration, report of chief personnel officer.

Surveying officer, report of.

Public defender.

Paymaster.

Magistrates' courts:

Magistrate, Cristobal, report of.

Magistrate, Balboa, report of.

Real estate section, report of chief.

Washington office, report of chief of office and general purchasing officer.

Pardon board, report of chairman.

Aeronautical inspector, report of.

General counsel, report of.

ANNUAL REPORT
OF THE
GOVERNOR OF THE PANAMA CANAL

BALBOA HEIGHTS, CANAL ZONE,
September 22, 1938.

THE SECRETARY OF WAR,
Washington, D. C.

SIR: I have the honor to submit the report of the Governor of the Panama Canal for the fiscal year ended June 30, 1938.

Respectfully,

C. S. RIDLEY, *Governor.*

INTRODUCTION

The administration of the affairs of the Panama Canal enterprises involves three main elements—(a) the operation and maintenance of the Canal itself; (b) the operation of the auxiliary enterprises necessary to provide adequately for the needs of shipping and of the Canal operating forces; and (c) the government of the Canal Zone, populated by American civilians, native or tropical workers and their families, and by the United States Army and Navy defense forces.

The immediate supervision of the administration of these various activities rests with the heads of the nine major departments and divisions reporting to the Governor, in whom is centered responsibility and control of the entire organization either in his capacity as Governor of the Panama Canal or as President of the Panama Railroad Co., an adjunct of the Canal enterprise, organized as a Government-owned corporation.

OPERATION AND MAINTENANCE OF THE CANAL

The primary function of the Panama Canal is to provide and maintain a waterway by means of which vessels may make the transit from one ocean to the other, and to handle such traffic as presents itself for transit with a maximum of safety and a minimum of delay. Essentially this involves the maintenance of the waterway, the operation of the locks, and the control of traffic through the Canal. Throughout

the year the Canal force maintained its high standard of expeditious service not only in the actual transiting of ships but in providing emergency repairs, fuel, supplies, and the various supplementary services incidental to shipping. There were no interruptions to traffic during the year.

OPERATION OF AUXILIARY ENTERPRISES—BUSINESS OPERATIONS

Secondary only to the operation of the Canal is the function of supplying various services to shipping. Commerce requires at the Canal certain adjuncts essential to shipping, such as fuel oil and coaling plants, storehouses for foodstuffs, ship chandlery, and other essential supplies, marine and railway repair shops, terminal facilities for the transshipment of cargo and passengers, a railroad line across the Isthmus and a steamship line between New York and Panama, quarters and commissaries for the operating force, and other adjuncts essential to the economical and efficient operation of the Canal. These services, under coordinated and centralized control, are provided by the various business units of the Panama Canal and Panama Railroad Co. The coordination of such services with the transit of ships through the Canal assists materially in the efficient and economical operation of the waterway. Moreover, in providing marine repair facilities, fuel, and other supplies, the operation of these business units promotes traffic through the Canal.

GOVERNMENT—ADMINISTRATION

The usual functions of government, such as schools, police and fire protection, quarantine, public health, immigration service, posts, customs, aids to navigation, steamboat inspection, hydrographic and meteorological work, water supply, sewers, construction and maintenance of streets, and similar activities, which, in the United States, are directed by various officers of the national, state, and municipal governments, are entrusted in the Canal Zone to the Governor, and are executed under his authority and responsibility. This centralization of all governmental activities under one head is essential to economical and efficient administration.

SERVICES RENDERED BY THE CANAL TO SHIPPING

The more important items of the business of the Canal and its adjuncts covering principal services to shipping are expressed numerically in the following table, which presents a comparison of the activities during the fiscal year 1938 with the 2 years immediately preceding:

	Fiscal year 1936	Fiscal year 1937	Fiscal year 1938
Transits of Canal by ocean-going ships paying tolls-----	5,382	5,387	5,524
Transits of small commercial traffic not counted in ocean-going traffic-----	621	807	931
Free transits of U. S. Army and Navy vessels, Colombian Government war vessels, vessels for repairs, etc-----	450	501	476
Total transits-----	6,453	6,695	6,931
Number of lockages during year:			
Gatun Locks-----	5,334	5,504	5,651
Pedro Miguel Locks-----	5,548	5,735	5,870
Miraflores Locks-----	5,538	5,605	5,813
Tolls levied on ocean vessels-----	\$23,479,114.21	\$23,102,137.12	\$23,169,888.70
Tolls on small commercial vessels-----	31,512.65	45,503.34	45,318.69
Total tolls-----	23,510,626.86	23,147,640.46	23,215,207.39
Cargo passing through Canal (tons)-----	26,505,943	28,108,375	27,385,924
Net tonnage (Panama Canal measurement) of transiting vessels-----	28,024,417	27,491,622	¹ 28,058,109
Cargo per Panama Canal net ton of ocean vessels, laden vessels only-----	1,083	1,188	1,123
Average tolls per ton of cargo, laden vessels only-----	\$0.788	\$0.722	\$0.750
Calls at Canal ports by ships not transiting Canal-----	1,008	863	865
Cargo handled and transferred at ports (tons)-----	1,373,179	1,446,818	1,530,287
Coal, sales and issues (tons)-----	41,813	71,561	103,844
Coal, number of commercial ships bunkered-----	215	296	312
Fuel oil pumped (barrels)-----	10,068,543	9,033,060	7,487,667
Fuel oil—number of ships served other than vessels operated by the Panama Canal-----	1,674	1,929	1,903
Ships repaired, other than Panama Canal equipment-----	594	601	633
Ships drydocked, other than Panama Canal equipment-----	119	120	106
Provisions sold to commercial ships (commissary sales)-----	\$304,547.29	\$354,341.59	\$327,943.72
Chandlery sold to ships (storehouse sales)-----	\$46,183.90	\$49,904.02	\$61,213.12

¹ As measured under rules in effect prior to Mar. 1, 1938.

REVENUES AND EXPENSES

The net revenues from Canal operations proper were \$13,909,903.26 as compared with \$13,136,585.23 last year. Net revenues from business operations under the Panama Canal for 1938 were \$824,612.60, as compared with \$917,360.14 in 1937. The combined net revenues accruing from the Canal and its business units totaled \$14,734,515.86, as compared with \$14,053,945.37 in 1937.

The gross capital investment as of the beginning of the fiscal year was \$538,160,472.92 and the net investment \$507,666,408.67. Net revenue for the year 1938 produced a return of 2.90 percent on this net investment as against 2.77 for the previous year.

The foregoing figures do not include the Isthmian operations carried on by the Panama Railroad Co., which yielded a net profit of \$1,183,453.40 for the year, as compared with \$1,358,595.79 for the previous fiscal year, a decrease of \$175,142.39, or 12.9 percent.

REPLACEMENTS

The past fiscal year marked the close of 24 years of successful operation of the Panama Canal; in fact, its dependable and efficient service is now taken for granted.

One of the factors which has made this possible is the high state of maintenance in which all wearing and deteriorating parts are kept. Of the total capital value of the Panama Canal there are approximately \$100,000,000 of general structural values pertaining to non-business units of the organization, which are subject to deterioration and require regular repair and periodical replacement.

Some of these structures, such as dams, and concrete buildings, are still in excellent condition and require but little expenditure for upkeep; but on others deterioration has reached a point where replacement should not longer be deferred. These necessary replacements include not only the frame buildings originally erected to serve during the period of the construction of the Canal, but also docks, highways, etc., which, due to ordinary deterioration and to earth slides and other unforeseen conditions, have been rendered inadequate or unserviceable for present requirements or uneconomical to maintain.

Funds for the replacement of worn-out plant and equipment for these nonbusiness units (with the exception of floating plant) must be appropriated for by Congress from the general funds of the Treasury, since no funded replacement reserves for these operations are maintained by the Panama Canal. However, in the Canal accounts depreciation charges are made on depreciable property, but the funds covering depreciation charges for nonbusiness units are turned in to the general fund of the Treasury each year and are not available without appropriation. Thus, for this part of the organization, we depend on Congress to provide from these funds (which have been deposited annually in the Treasury in prior years) the necessary replacement of worn-out and obsolete plant to maintain the enterprise up to the standard of operation.

Not only is there demand for replacement of some of the existing facilities but also the need develops for new kinds of facilities. Funds for such new facilities must also be obtained by direct appropriation.

For these reasons, it is essential to the continued efficiency of the Canal and to the growth of its facilities to meet the growing demands that the Bureau of the Budget and the Congress give careful consideration to the requirements submitted annually by the Governor for these purposes.

SECTION I

CANAL OPERATION AND TRADE VIA THE PANAMA CANAL STATISTICS OF CANAL TRAFFIC

The number of ocean-going commercial vessels¹ making transit of the Panama Canal in 1938 aggregated 5,524 in comparison with 5,387 in 1937, an increase of 137, or 2.5 percent. This represents a daily average of 15.13, as compared with 14.76 in 1937, 14.70 in 1936, 14.19 in 1935, and 14.34 in 1934. With respect to the number of transits, the fiscal year 1938 was the fourth highest in the history of the Canal, being exceeded only by a total of 6,289 in 1929 (the peak year), 6,253 in 1928, and 6,027 in 1930.

Tolls on the 5,524 transits in 1938 totaled \$23,169,888.70, in comparison with \$23,102,137.12 in 1937, an increase of \$67,751.58, or 0.29 percent.

Cargo tonnage amounted to 27,385,924 in 1938, in comparison with 28,108,375 in 1937, a decrease of 722,451 tons, or 2.6 percent.

Panama Canal net tonnage on the ocean-going commercial vessels transiting the Canal during 1938 aggregated 28,058,109 in comparison with 27,491,622 in 1937, an increase of 566,487, or 2.1 percent. The tonnage figure for 1938 (28,058,109) indicates the net tonnage as determined under the rules of measurement in effect prior to March 1, 1938. A discussion of the new rules of measurement and rates of tolls appears on page 30 of this report under the caption of "Inauguration of New Rules of Measurement and Rates of Toll."

While traffic for 1938 made a slight increase in comparison with 1937 (with the exception of the tonnage of cargo carried), the traffic in 1937 had been seriously affected by a maritime strike in the United States for a period of over 3 months. Had there been no strike, traffic for 1938 would have been substantially lower than for the previous year.

A brief review of traffic from the opening of the Canal on August 15, 1914, indicates that there was a gradual growth of traffic starting with a total of 1,058 transits in the fiscal year 1915 and reaching a total of 6,289 transits in the fiscal year 1929. The fiscal year 1929 may be considered the record year in Canal traffic with the total of 6,289 transits (an average of 17.2 transits per day), total tolls of \$27,111,125, and total cargo carried through the Canal of 30,647,768

¹ Includes all tolls-paying vessels having a measurement of 300 or more net tons (Panama Canal measurement) or 500 or more displacement tons.

tons, although the Panama Canal net tonnage of 29,822,122 of the ships in the fiscal year 1929 was slightly exceeded the following year (the fiscal year 1930) when the Panama Canal net tonnage was 29,963,670. From these record levels the world-wide depression reduced Canal traffic during the next four years so that the number of transits was only 4,162 in the fiscal year ended June 30, 1933. Traffic has gradually increased since 1933 but is still well below the high peaks reached in 1929 and 1930.

The following table shows a comparison between traffic in the fiscal years 1938 and 1929, indicating the relationship of these 2 years and the percentage of 1938 traffic to the peak traffic of 1929:

	Number of transits	Panama Canal net tonnage	Tolls	Tons of cargo
Fiscal year 1929-----	6,289	29,822,122	\$27,111,125	30,647,768
Fiscal year 1938-----	5,524	1 28,058,109	\$23,169,889	27,385,924
Percentage of traffic (1938 ÷ 1929)-----	87.8	94.1	85.5	89.4

¹ As measured under rules in effect prior to Mar. 1, 1938.

Although, in general, Panama Canal traffic has followed the trends outlined in the preceding paragraphs, it has been subject to considerable fluctuation due to increases and decreases in the number of tankers transiting the Canal, largely carrying cargo from the oil fields in California. These surges in the tanker traffic have not followed the variations in the balance of Canal traffic but have varied from a peak of 1,704 transits in 1924, when tankers comprised 33.1 percent of the total Canal transits, to a total of only 562 transits in the past year (1938), when tankers comprised but 10.2 percent of the total. Mineral oil shipments caused a very sharp increase in traffic in 1923 and 1924, and the following slight decline, as well as a part of the increase in 1934 and the small decline in the following year. For this reason the trends of traffic through the Panama Canal are more easily understood when a distinction is made between tankers and all other types of ships. The tables on pages 10 and 11 of this report segregate traffic between these two classes of ships.

A decline in the movement of cargo in both directions contributed to the decrease in cargo tonnage in 1938 as compared with 1937. West-bound shipments declined 207,072 tons, or 2.1 percent, while those in the opposite direction fell off 515,379 tons, or 2.8 percent. Trade between the east and west coasts of the United States has been for many years the most important route served by the Canal. In the west-bound movement in the United States intercoastal trade, cargo shipments decreased 233,228 tons, or 10.0 percent, while the east-bound movement increased slightly—87,646 tons, or 2.2 percent. The decrease in the west-bound movement was largely due to fewer

shipments of manufactured articles and probably reflects the reduced business conditions in the United States during the past year. Cargo movement between the United States and the Far East (excluding the Philippine Islands) showed declines in both directions, the shipments to the United States from the oriental nations declining by 35 percent. Shipments from the United States to the Far East have constituted the greatest movement over any of the west-bound trades during the past 2 years. Although very large during the past year, this trade was some 200,000 tons less than in the previous year due principally to a slight decrease in scrap-iron shipments. The shipments of scrap metal to the Far East have shown extreme fluctuations for the past several years. In August 1937 these reached a total of 168,000 tons, but in the following months declined and in December 1937 consisted of only 500 tons. In the next few months there was a gradual increase until May 1938, when these scrap shipments totaled 223,000 tons.

In other principal trades declines were recorded in that between Europe and South America, that between Europe and the west coast of Canada, and that between the United States and the Hawaiian Islands. The decline in east-bound movement of cargo between Canada and Europe was the most pronounced of the declines in these three trades and may be attributed to the sharp decrease in Canadian wheat shipments.

Increases were recorded in the trade between the east coast of the United States and South America, that between Europe and the United States, that between the United States and the Philippine Islands, and those between both Europe and the United States and Australasia. The east-bound movement from the United States to Europe showed one of the biggest of these increases and was due to the large volume of American wheat shipments, which offset part of the decline in Canadian wheat shipments. The increase in the east-bound movement from the Philippine Islands to the United States was due to more shipments of sugar.

Further details of the individual commodities and of the trade routes served by the Canal are presented on pages 14 to 21 of this report.

In the fiscal year 1938, transits of local commercial vessels under 300 tons, Panama Canal measurement, numbered 931, on which tolls of \$45,318.69 were paid. Transits of naval and other public vessels of the United States and Panamanian Governments, war vessels of the Colombian Government, and vessels transiting solely for repairs, none of which paid tolls, numbered 476, as against 501 for 1937. The total of all tolls-paying and free transits combined numbered 6,931, in comparison with 6,695 in 1937, equivalent to averages of 18.99 and 18.34 transits per day, respectively.

The receipts from tolls as reported to the United States Treasury for the fiscal year 1938 were \$23,215,192.39. This figure includes tolls on local commercial traffic amounting to \$45,318.69, which are not included in the Canal statistics covering ocean-going commercial traffic. The toll receipts reported to the United States Treasury moreover reflect minor adjustments for overcharges and under collections amounting to \$15. These two items account for the difference of \$45,303.69 between the tolls receipts reported to the Treasury and the figure for tolls levied on ocean-going commercial traffic as reported in the following studies of traffic which are based on tolls levied at the time of transit.

CANAL TRAFFIC BY FISCAL YEARS 1915 TO 1938

Comparative traffic statistics covering ocean-going vessels for each fiscal year since the Canal was opened to navigation are shown in the table following:

Fiscal year ended June 30—	Number of transits	Panama Canal net tonnage	Tolls	Tons of cargo
1915 ¹	1,058	3,791,770	\$4,366,747.13	4,888,400
1916 ²	724	2,391,433	2,403,039.40	3,093,335
1917	1,738	5,791,236	5,620,799.83	7,054,720
1918	1,989	6,563,864	6,428,780.26	7,525,768
1919	1,948	6,116,877	6,164,290.79	6,910,097
1920	2,393	8,538,804	8,507,938.68	9,372,374
1921	2,791	11,405,550	11,268,681.46	11,595,971
1922	2,665	11,411,482	11,191,828.56	10,882,607
1923	3,908	18,601,298	17,504,027.19	19,566,429
1924	5,158	26,142,021	24,284,659.92	26,993,167
1925	4,592	22,847,527	21,393,718.01	23,956,549
1926	5,087	24,763,075	22,919,931.89	26,030,016
1927	5,293	26,210,623	24,212,250.61	27,733,555
1928	6,253	29,435,697	26,922,200.75	29,615,651
1929	6,289	29,822,122	27,111,125.47	30,647,768
1930	6,027	29,963,670	27,059,998.94	30,018,429
1931	5,370	27,773,037	24,624,599.76	25,065,283
1932	4,362	23,613,370	20,694,704.61	19,798,986
1933	4,162	22,803,798	19,601,077.17	18,161,165
1934	5,234	28,550,953	24,047,183.44	24,704,009
1935	5,180	27,805,588	23,307,062.93	25,309,527
1935 ³	5,382	28,024,417	23,479,114.21	26,505,943
1937	5,387	27,491,622	23,102,137.12	28,108,375
1938	5,524	³ 28,058,109	23,169,888.70	27,385,924
Total	98,514	477,918,943	429,385,836.83	470,924,048

¹ Canal opened to traffic Aug. 15, 1914.

² Canal closed to traffic approximately 7 months of fiscal year by slides.

³ As measured under rules in effect prior to Mar. 1, 1938.

TRAFFIC BY MONTHS—FISCAL YEARS 1937 AND 1938

The ocean-going commercial traffic during each month of the fiscal year 1938 is summarized in the following table, in which are inserted for comparison corresponding figures for the preceding year:

Month	Number of vessels		Panama Canal net tonnage		Tons of cargo		Tolls	
	1936-37	1937-38	1936-37	1937-38	1936-37	1937-38	1936-37	1937-38
July.....	456	457	2,364,539	2,395,306	2,450,324	2,476,366	\$1,999,105.18	\$2,029,612.45
August.....	473	505	2,398,306	2,597,119	2,396,331	2,780,603	2,051,540.25	2,195,308.87
September.....	466	444	2,428,317	2,312,725	2,526,366	2,385,142	2,015,440.82	1,935,673.78
October.....	482	461	2,499,678	2,359,406	2,463,069	2,438,788	2,081,758.23	1,981,057.87
November.....	368	435	1,768,738	2,280,565	1,747,368	2,185,283	1,488,054.25	1,893,462.00
December.....	341	439	1,655,501	2,288,271	1,538,503	2,046,170	1,366,388.58	1,845,018.20
January.....	399	444	1,915,787	2,219,496	1,855,937	2,095,402	1,598,323.51	1,837,894.72
February.....	377	436	1,940,611	2,154,222	1,839,788	1,998,827	1,602,306.30	1,786,611.45
March.....	536	506	2,770,451	2,511,671	3,016,418	2,268,548	2,355,149.01	2,015,585.34
April.....	473	487	2,460,549	2,438,985	2,652,880	2,279,235	2,067,026.68	1,961,456.58
May.....	544	465	2,839,127	2,322,642	2,950,925	2,309,171	2,376,706.36	1,886,825.66
June.....	472	445	2,450,018	2,227,698	2,670,466	2,122,389	2,070,337.89	1,801,291.78
Total.....	5,387	5,524	27,491,622	28,058,109	28,108,375	27,385,921	23,102,137.12	23,169,888.70
Average per month.	449	460	2,290,969	2,338,176	2,342,365	2,282,160	1,925,178.09	1,930,824.06

¹ These figures indicate the Panama Canal net tonnage as determined under the rules of measurement in effect prior to Mar. 1, 1938. The Panama Canal net tonnage for these 4 months as determined under the rules now in effect was as follows: March 1938, 2,311,526; April 1938, 2,258,836; May 1938, 2,150,228; and June 1938, 2,064,793.

TANKER TRAFFIC

Tanker traffic, which had been such an important component of Canal traffic during the years 1923 through 1931, has gradually declined, and during the past year was smaller than it has been during any fiscal year since the start of the mineral oil shipments from California in 1923. Transits of tank ships during the fiscal year 1938 totaled 562, a decrease of 81, or 12.6 percent, in comparison with the 1937 total of 643. Tanker transits in 1938 comprised 10.2 percent of the total ocean-going commercial transits, made up 11.5 percent of the total net tonnage (Panama Canal measurement), paid 12.3 percent of the total tolls collected, and carried 13.1 percent of the cargo which passed through the Canal.

Cargo carried through the Canal in tank ships during the fiscal year 1938 amounted to 3,584,615 tons, in comparison with 4,365,620 in 1937, a decrease of 781,005 tons, or 17.9 percent. Segregation of the 1938 traffic by direction of transits shows that 606,020 tons of tanker cargo went through from the Atlantic to the Pacific, and 2,978,595 from the Pacific to the Atlantic.

Of the mineral oil cargoes carried through the Canal during the fiscal year 1938, approximately 38 percent was gasoline, benzene, and naphtha; 31 percent crude oil; 22 percent Diesel and fuel oils; and the remainder, 9 percent, lubricating oils and kerosene.

The three tables below, which begin with the fiscal year 1923 and thus cover the period during which tankers have been an important component of the traffic through the Canal, show the traffic divided between tank ships and all other ocean-going commercial or tolls-paying vessels, classified herein as "all other." The tables show the number and daily averages of the two classes, and of the total; the

quantities and proportion of net tonnages, and the amounts and proportions of tolls:

Number and daily average transits of tankers and all other carriers

Fiscal year	Ocean-going commercial transits			Daily average		
	Tankers	All other	Total	Tankers	All other	Total
1923.....	913	2,995	3,908	2.5	8.2	10.7
1924.....	1,704	3,454	5,158	4.7	9.4	14.1
1925.....	1,079	3,513	4,592	3.0	9.6	12.6
1926.....	1,090	3,997	5,087	3.0	11.0	14.0
1927.....	1,324	3,969	5,293	3.6	10.9	14.5
1928.....	1,121	5,132	6,253	3.0	14.0	17.0
1929.....	1,083	5,206	6,289	3.0	14.2	17.2
1930.....	1,218	4,809	6,027	3.3	13.2	16.5
1931.....	944	4,426	5,370	2.6	12.1	14.7
1932.....	612	3,750	4,362	1.7	10.2	11.9
1933.....	636	3,526	4,162	1.7	9.7	11.4
1934.....	942	4,292	5,234	2.6	11.7	14.3
1935.....	791	4,389	5,180	2.2	12.0	14.2
1936.....	598	4,784	5,382	1.6	13.1	14.7
1937.....	643	4,744	5,387	1.8	13.0	14.8
1938:						
July.....	61	396	457	1.9	12.8	14.7
August.....	71	434	505	2.3	14.0	16.3
September.....	47	397	444	1.6	13.2	14.8
October.....	46	415	461	1.5	13.4	14.9
November.....	44	391	435	1.5	13.0	14.5
December.....	35	404	439	1.1	13.1	14.2
January.....	39	405	444	1.2	13.1	14.3
February.....	33	403	436	1.2	14.4	15.6
March.....	39	467	506	1.2	15.1	16.3
April.....	55	432	487	1.8	14.4	16.2
May.....	48	417	465	1.5	13.5	15.0
June.....	44	401	445	1.5	13.3	14.8
Total.....	562	4,962	5,524	1.5	13.6	15.1

Proportions of tanker and all other net tonnage

Fiscal year	Panama Canal net tonnage			Percentage of total net tonnage		
	Tankers	All other	Total	Tankers	All other	Total
1923.....	5,374,384	13,226,914	18,601,298	28.9	71.1	100.0
1924.....	10,212,047	15,929,974	26,142,021	39.1	60.9	100.0
1925.....	6,424,622	16,422,905	22,847,527	28.1	71.9	100.0
1926.....	6,343,240	18,419,835	24,763,075	25.6	74.4	100.0
1927.....	7,624,112	18,586,511	26,210,623	29.1	70.9	100.0
1928.....	6,243,969	23,192,728	29,436,697	21.2	78.8	100.0
1929.....	5,844,263	23,977,859	29,822,122	19.6	80.4	100.0
1930.....	6,564,138	23,399,532	29,963,670	21.9	78.1	100.0
1931.....	5,284,873	22,488,164	27,773,037	19.0	81.0	100.0
1932.....	3,570,398	20,042,972	23,613,370	15.1	84.9	100.0
1933.....	3,808,784	18,995,014	22,803,798	16.7	83.3	100.0
1934.....	5,811,995	22,738,958	28,550,953	20.4	79.6	100.0
1935.....	4,676,761	23,128,827	27,805,585	16.8	83.2	100.0
1936.....	3,487,498	24,536,919	28,024,417	12.4	87.6	100.0
1937.....	3,747,306	23,744,316	27,491,622	13.6	86.4	100.0
1938.....	13,219,440	124,838,669	128,058,109	11.5	88.5	100.0

¹ As measured under rules in effect prior to Mar. 1, 1938.

Proportion of tolls from tank ships and from all other vessels

Fiscal year	Tolls paid by shipping using Canal			Percentage of total tolls		
	Tankers	All other	Total	Tankers	All other	Total
1923-----	\$4,769,321.63	\$12,731,702.56	\$17,504,027.19	27.2	72.8	100.0
1924-----	9,071,835.65	15,212,824.27	24,284,659.92	37.4	62.6	100.0
1925-----	5,728,302.26	15,665,415.75	21,393,718.01	26.8	73.2	100.0
1926-----	5,626,167.93	17,293,763.96	22,919,931.89	24.5	75.5	100.0
1927-----	6,658,806.90	17,553,413.71	24,212,250.61	27.5	72.5	100.0
1928-----	5,436,437.16	21,485,763.59	26,922,200.75	20.2	79.8	100.0
1929-----	5,145,632.19	21,965,493.28	27,111,125.47	19.0	81.0	100.0
1930-----	5,768,963.28	21,291,035.66	27,059,998.94	21.3	78.7	100.0
1931-----	4,682,320.14	19,942,279.62	24,624,599.76	19.0	81.0	100.0
1932-----	3,197,136.29	17,497,568.32	20,694,704.61	15.4	84.6	100.0
1933-----	3,393,311.02	16,207,766.15	19,601,077.17	17.3	82.7	100.0
1934-----	5,161,787.40	18,885,396.01	24,047,183.44	21.5	78.5	100.0
1935-----	4,192,863.09	19,114,199.84	23,307,062.93	18.0	82.0	100.0
1936-----	3,192,498.46	20,286,615.75	23,479,114.21	13.6	86.4	100.0
1937-----	3,451,771.65	19,650,365.47	23,102,137.12	14.9	85.1	100.0
1938-----	2,846,711.79	20,323,176.91	23,169,888.70	12.3	87.7	100.0

NATIONALITY OF VESSELS TRANSITING CANAL

Segregation of the ocean-going traffic through the Canal during the fiscal year 1938, by nationality, is presented in the following table which shows transits, measurement tonnage, tolls, and tons of cargo:

Ocean-going commercial traffic¹ through the Panama Canal during the fiscal year 1938, by nationality of vessels

Nationality	Number of ships	Measurement tonnage			Tolls	Tons of cargo
		Panama Canal net ²	Registered gross	Registered net		
British-----	1,281	7,265,195	8,528,886	5,176,530	\$6,095,622.89	6,417,016
Chilean-----	9	45,920	59,041	35,649	38,542.20	28,787
Chinese-----	2	7,893	10,025	6,270	7,851.25	13,113
Cuban-----	2				1,200.00	
Danish-----	223	969,514	955,962	592,007	707,358.05	865,255
Estonian-----	2	4,674	6,396	3,916	4,131.39	4,695
Finnish-----	1	3,575	4,746	2,889	3,198.60	4,021
French-----	105	587,292	720,290	400,562	478,537.58	567,288
German-----	357	1,461,033	1,701,376	1,005,063	1,219,327.57	1,518,593
Greek-----	94	423,646	489,982	298,333	306,886.38	325,351
Honduran-----	22	37,384	58,475	34,176	33,432.02	8,478
Hungarian-----	5	19,929	20,460	12,878	15,938.22	24,411
Italian-----	52	357,925	431,293	257,021	275,883.26	153,417
Japanese-----	300	1,846,315	2,166,163	1,328,873	1,597,308.26	1,877,502
Latvian-----	3	8,310	9,612	5,625	6,356.70	4,900
Netherlands-----	285	825,287	914,771	543,373	669,937.78	749,642
Norwegian-----	667	3,289,306	3,643,322	2,179,898	2,581,563.96	3,433,571
Panamanian-----	182	368,885	504,187	286,529	319,081.22	415,561
Peruvian-----	5	9,759	14,260	8,751	9,802.45	7,151
Philippine Islands-----	3	18,565	21,463	13,240	13,929.30	8,441
Soviet-----	5	9,525	13,252	8,215	9,315.95	10,419
Spanish-----	2	9,085	12,389	7,495	9,416.25	15,280
Swedish-----	119	579,572	926,474	467,988	446,034.54	763,049
United States-----	1,780	9,905,991	11,591,450	6,897,586	8,204,528.23	9,892,619
Venezuelan-----	4	5,668	9,714	5,304	4,899.78	3,971
Yugoslavian-----	14	57,771	71,188	43,669	49,804.87	73,413
Total, fiscal years:						
1938-----	5,524	28,058,109	32,918,177	19,621,870	23,169,888.70	27,385,924
1937-----	5,387	27,491,622	32,575,300	19,303,366	23,102,137.12	28,108,375
1936-----	5,382	28,024,417	33,130,259	19,643,946	23,479,114.21	26,505,943

¹ Ocean-going commercial traffic includes only tolls-paying vessels of 300 net tons and over, Panama Canal measurement, and vessels paying tolls on displacement tons of 500 displacement tons and over.

² As determined under the measurement rules in effect prior to Mar. 1, 1938.

CARGO CARRIED BY VESSELS OF LEADING MARITIME NATIONS

Segregating the traffic through the Canal by nationality of vessels, the following table shows the aggregate cargo carried by ships of the leading maritime nations during each of the past 5 fiscal years. For the year 1938 the percentage of total cargo carried by ships of each nationality is also shown:

Nationality	1934	1935	1936	1937	1938	
					Tons	Percent- age
United States.....	11,578,453	10,825,573	10,700,535	9,844,254	9,892,619	36.1
British.....	5,193,136	5,776,021	6,181,571	7,179,136	6,417,016	23.4
Norwegian.....	2,080,833	2,463,675	2,717,860	3,506,109	3,433,571	12.5
Japanese.....	1,510,916	1,446,049	1,697,880	1,789,178	1,877,502	6.9
German.....	962,218	1,300,991	1,305,090	1,496,084	1,518,593	5.5
Danish.....	533,262	555,981	627,407	757,379	865,235	3.2
Swedish.....	766,921	782,548	855,409	775,800	763,049	2.8
Netherlands.....	403,451	439,168	511,620	700,725	749,642	2.7
French.....	430,471	570,034	544,343	542,539	567,288	2.1
All remaining.....	1,244,348	1,149,487	1,364,228	1,517,171	1,301,409	4.8
Total.....	21,704,009	25,309,527	26,505,943	28,108,375	27,385,924	100.0

VESSELS PAYING TOLLS ON DISPLACEMENT TONNAGE

In the Canal traffic statistics, foreign naval vessels such as colliers, transports, supply ships, etc., with a measurement of 300 net tons (Panama Canal measurement) or more, and floating craft, such as vessels of war, dredges, etc., with a displacement measurement of 500 tons or more, are classified as ocean-going commercial vessels. Statistics on these vessels, except as relates to displacement tonnage, have been included in the traffic summaries shown on the preceding pages. As displacement tonnage cannot be combined with net tonnage, however, the following table shows statistics on eleven foreign naval vessels and one United States dredge which transited the Canal during the fiscal year 1938 and paid tolls on displacement tonnage:

Nationality	Type of vessel	Number of transits	Displacement tonnage	Tolls
British.....	Warship.....	7	36,233	\$18,116.50
Cuban.....	.....do.....	2	2,400	1,200.00
French.....	.....do.....	1	7,429	3,714.50
German.....	.....do.....	1	13,312	6,656.00
United States.....	Dredge.....	1	1,370	685.00
Total.....		12	60,744	30,372.00

VESSELS ENTITLED TO FREE TRANSIT

Naval and other vessels owned and operated in the Government service of the United States and Panama, war vessels of Colombia, and vessels transiting solely for repairs at the Balboa shops, are exempt from the payment of tolls, and such vessels are not included in the general transit statistics in this section.

The following shows the vessels of each group, the measured tonnage, the amount of tolls to which they would have been subject at the prescribed rates if tolls had been charged against them, and the cargo carried by such vessels in ocean-to-ocean movement:

Class	Number of transits	Panama Canal net tonnage ¹	Displacement tonnage	Tolls	Tons of cargo
U. S. Navy.....	242	136,000	285,571	\$279,000.00	43,738
U. S. Army.....	192	404,000	20,168	345,000.00	53,852
Other U. S. Government.....	7	.....	6,080	3,040.00	.....
Total, U. S. Government.....	441	540,000	311,819	627,040.00	97,590
Colombian Government.....	6	15,259	320	11,146.00	.....
Panamanian Government.....	1	10	.....	7.20	.....
Vessels transiting for repairs only.....	28	40,000	.....	28,000.00	6,300
Grand total.....	476	595,269	312,139	666,193.20	103,890

¹ As determined under the measurement rules in effect prior to Mar. 1, 1938.

SMALL COMMERCIAL VESSELS TRANSITING CANAL

Transits of small cargo-carrying vessels, and other small craft such as yachts, tugs, etc., of less than 300 tons, Panama Canal measurement, or less than 500 tons, displacement measurement, are excluded from the statistics of ocean-going commercial traffic, although they are not exempt from the payment of tolls. The number of these small vessels transiting the Canal during the year, together with the tonnage, tolls, and amount of cargo carried, is shown in the following table:

	Number of transits	Tonnage		Tolls	Tons of cargo
		Panama Canal net ¹	Displacement		
Atlantic to Pacific.....	532	25,733	.....	\$22,687.52	10,969
Pacific to Atlantic.....	399	22,719	.....	22,631.17	22,121
Total.....	931	48,452	.....	45,318.69	33,090

¹ As determined under the measurement rules in effect prior to Mar. 1, 1938.

CARGO SHIPMENTS SEGREGATED BY PRINCIPAL TRADE ROUTES

Cargo shipments through the Panama Canal during the fiscal year 1938 and in the three preceding years, segregated by principal trade routes, are shown in the following tabulation:

	Tons of cargo			
	1935	1936	1937	1938
United States intercoastal:				
Atlantic to Pacific.....	2,162,641	2,578,508	2,575,075	2,341,847
Pacific to Atlantic.....	5,800,769	5,140,567	3,965,082	4,052,728
Total.....	7,963,410	7,719,075	6,540,157	6,394,575
United States and Far East (excluding Philippine Islands):				
Atlantic to Pacific.....	2,398,667	1,872,357	3,265,672	3,092,992
Pacific to Atlantic.....	507,448	585,961	662,047	433,544
Total.....	2,906,115	2,458,318	3,927,719	3,526,536
Europe and South America:				
Atlantic to Pacific.....	304,212	395,917	460,777	453,298
Pacific to Atlantic.....	2,640,962	2,330,136	2,661,698	2,520,600
Total.....	2,945,174	2,726,053	3,122,475	2,973,898
East coast United States and west coast South America:				
Atlantic to Pacific.....	142,870	199,199	208,218	262,207
Pacific to Atlantic.....	1,380,790	1,909,185	2,359,431	2,389,649
Total.....	1,523,660	2,108,334	2,567,649	2,651,856
Europe and United States:				
Atlantic to Pacific.....	379,785	614,703	534,749	449,765
Pacific to Atlantic.....	1,388,187	1,788,865	1,435,003	1,972,196
Total.....	1,767,972	2,403,568	1,969,752	2,421,961
Europe and Canada:				
Atlantic to Pacific.....	77,282	95,142	106,296	98,702
Pacific to Atlantic.....	2,335,108	2,377,190	2,467,874	1,716,157
Total.....	2,412,390	2,472,332	2,574,170	1,814,859
United States and Philippine Islands:				
Atlantic to Pacific.....	133,613	170,134	242,612	217,560
Pacific to Atlantic.....	559,978	809,707	783,657	1,106,130
Total.....	693,591	979,841	1,026,269	1,323,690
Europe and Australasia:				
Atlantic to Pacific.....	320,280	419,824	473,333	545,553
Pacific to Atlantic.....	615,144	636,997	670,192	705,917
Total.....	935,424	1,056,821	1,143,525	1,251,470
United States and Australasia:				
Atlantic to Pacific.....	277,477	356,117	316,004	471,299
Pacific to Atlantic.....	152,567	155,875	236,259	157,048
Total.....	430,044	511,992	552,263	628,347
United States and Hawaiian Islands:				
Atlantic to Pacific.....	111,030	142,774	184,517	151,839
Pacific to Atlantic.....	368,024	371,892	506,320	450,000
Total.....	479,054	514,666	690,837	601,839
Miscellaneous routes and sailings:				
Atlantic to Pacific.....	1,221,864	1,405,224	1,528,379	1,603,498
Pacific to Atlantic.....	2,030,829	2,149,669	2,465,180	2,193,395
Total.....	3,252,693	3,554,893	3,993,559	3,796,893
Total traffic, all routes:				
Atlantic to Pacific.....	7,529,721	8,249,899	9,895,632	9,688,560
Pacific to Atlantic.....	17,779,806	18,256,044	18,212,743	17,697,364
Total.....	25,309,527	26,505,943	28,108,375	27,385,924

ORIGIN AND DESTINATION OF CARGO

The following tables show the origin and destination, by principal trade areas, of the cargoes carried by steamers passing through the Canal during the past fiscal year; one table covers the movement of cargo from the Atlantic to the Pacific and the other from the Pacific to the Atlantic:

Origin and destination of cargo through the Panama Canal during 1938 from Atlantic to Pacific, segregated by countries in principal trade areas

From—	To west coast, North America						To west coast, South America				Total
	United States	Canada	Central America and Mexico ¹	Balboa ¹	Hawaiian Islands	Total	Chile	Colombia	Ecuador	Peru	
East coast, North America:											
United States:											
North Atlantic ports	1,686,915	5,628	Tons 2,799	Tons 4,240	Tons 142,730	Tons 1,842,312	Tons 129,696	Tons 9,546	Tons 81,056	Tons 3,946	Tons 246,188
South Atlantic ports	67,878	17,413	3,406	29,452	8,205	72,128	40	7,501	8,478	—	40
Gulf ports.	587,054	—	—	—	—	—	—	—	—	—	15,979
Total, United States	23,041	6,205	33,692	151,839	2,536,624	21,924	129,736	21,924	17,047	89,634	3,966
Canada	2,341,817	54,308	61,413	—	—	—	3,819	135	—	2,040	—
Central America and Mexico	35	—	—	—	—	—	115,721	14,722	—	—	5,944
Cristobal, Canal Zone ¹	23,590	665	48,379	—	—	72,634	35	37,257	34,702	17,586	11,722
West Indies	2,095	7,322	7,723	97,752	2	114,894	166,243	2,495	16,119	66	112,707
Total, North America	92,441	62,307	131,444	151,841	2,859,908	351,777	59,256	50,752	113,618	5,022	580,425
Europe:											
British Isles	51,606	63,758	6,172	—	—	121,536	45,494	6,050	4,885	24,704	—
Belgium	119,758	15,889	13,218	2,056	—	153,559	44,253	6,160	12,999	46,833	61
Denmark	3,790	114	—	—	2,638	—	3,964	7	—	57	110,133
France	17,434	1,824	—	—	—	19,848	26,339	3	9	2,887	27
Germany	73,009	37,313	1,521	3,620	—	69,426	12,651	19,272	—	58,202	299
Italy	6,647	1,371	3,211	14	—	11,243	3,835	—	3,372	—	7,207
Netherlands	46,483	7,094	1	44	—	53,622	12,555	1,744	1,717	14,864	30,880
Norway	45,588	196	5,388	11,380	—	62,482	6,956	1,387	1,048	1,808	6
Russia	—	—	—	—	—	—	—	—	—	—	—
Spain and Portugal	—	—	—	—	—	—	—	—	—	—	—
Sweden	57,324	4,459	2,225	1,817	38	65,864	16,972	5,931	665	6,138	50
Europe ¹	28,156	72	635	—	—	28,883	1,066	294	338	888	3,036
Total, Europe	449,765	98,702	68,708	16,818	5,736	639,729	214,903	34,220	40,933	159,763	3,479
East coast, South America	107,606	11,812	—	—	—	119,450	95,328	26,632	129	4,004	—
Asia	5,426	10,722	—	—	—	—	—	—	—	—	126,113
Africa (except Egypt)	5,263	10,732	—	—	—	—	—	—	—	—	—
Egypt	35	—	—	—	—	—	—	—	—	—	—
Grand total	2,984,970	213,779	131,015	148,351	157,577	3,635,692	662,008	120,128	91,814	277,385	8,501
Percent of total west-bound cargo, 1938	30.8	2.2	1.4	1.5	1.6	6.9	1.2	0.9	0.1	12.0	—
Percent of total west-bound cargo, 1937	33.4	2.4	1.5	1.4	1.9	40.6	5.9	1.3	2.8	1.1	10.9
Percent of total west-bound cargo, 1936	41.1	2.7	1.8	1.4	1.9	48.9	6.1	1.3	1.2	2.6	11.6

From—	To Australasia				To Asia				Grand total	Percent of total west-bound cargo		
	Australia	New Zealand	Australasia ¹	Total	Philippines	China	Japan	Far East ²		1936	1937	1938
East coast, North America:												
United States:												
North Atlantic ports	218,033	53,913	Tons	588	Tons	Tons	Tons	Tons	Tons	4,306,635	44.0	45.1
South Atlantic ports	8,183				22,554	280,460	1,495,888	26,307	4,305,581	45,316	3.8	3.8
Gulf ports	135,602	54,950			190,552	5,220	101,130	1,103,181	5,258	1,29,655	2,058,370	21.3
Total, United States	361,848	108,863	Tons	588	471,299	217,560	386,819	2,677,232	28,911	3,310,532	6,606,682	69.1
Canada	143,757	64,916			208,703	103	214	61,136	61,436	391,906	3,6	3.8
Central America and Mexico	97,687	17,055			114,742	—	16,360	—	16,360	115,859	1.9	1.4
Cristobal Canal Zone ¹	—	10			297	—	—	5,665	—	19,188	1.9	1.5
West Indies	9,800	113			9,913	—	3	22,448	15,844	38,295	318,025	3.5
Total, North America	603,322	200,644	Tons	998	304,964	217,966	409,484	2776,237	28,976	3,432,363	7,677,660	76.1
Europe:										76.1	79.2	79.2
British Isles	13,312	45,730	Tons	22,874	461,916	—	—	—	—	684,585	7.2	6.6
Belgium	—	46,137			46,137	—	—	—	—	314,321	3.4	3.0
Denmark	—	—			—	—	—	—	—	3,908	—	3.2
France	—	4			10,298	10,317	—	—	—	53,439	—	—
Germany	—	—			2,104	2	1,035	19,335	9	20,390	301,132	3.4
Italy	—	2,104			—	—	—	—	—	18,450	2.2	3.1
Norway	—	10			20	—	—	1,885	—	86,417	—	—
Netherlands	—	131			181	351	—	—	—	68,038	—	—
Russia	—	—			—	—	—	—	—	—	—	—
Spain and Portugal	—	—			—	—	—	—	—	—	—	—
Sweden	—	1,043			2,863	267	4,173	—	—	99,735	1.0	1.0
Europe ¹	—	—			525	—	—	—	—	35,040	—	—
Total, Europe	14,398	497,515	Tons	33,610	545,553	2	3,638	22,957	9	26,006	1,665,186	19.6
East coast, South America:										311,339	4.2	3.7
Asia (except Egypt)										5,101	—	3.2
Africa (except Egypt)										8,700	—	—
Egypt										35	—	—
Grand total	617,720	698,159	Tons	39,159	1,355,038	—	—	—	—	3,537,994	9,688,560	100.0
Percent of total west-bound cargo, 1938	6.4	7.2	Tons	0,4	14.0	2,3	4,3	—	—	36,5	—	—
Percent of total west-bound cargo, 1937	—	6.3		—	11.4	—	3.1	—	—	37.1	—	—
Percent of total west-bound cargo, 1936	5.4	6.6		—	12.5	2.1	2.8	—	—	27.0	—	—

¹ Includes both local and transit cargo.
² General cargo not routed so as to allow segregation between definite countries.

Origin and destination of cargo through the Panama Canal during 1938 from Pacific to Atlantic, segregated by countries in principal trade areas

From—	To United States				To other North America				To Europe			
	North Atlantic Ports	South Atlantic Ports	Gulf ports	Total	Canada	Central America and Mexico	Caribbean Canal Zone	West Indies	Total, North America	British Isles	Belgium	Denmark
West coast, North America:												
United States.....	3,525,409	179,074	4,052,728	4,052,728	10,441	42,880	29,978	212,238	4,736,027	1,049,808	145,134	27,522
Canada.....	105,004	52,301	157,305	21,385	4,356	4,356	29,192	1,483,022	1,483,022	77,963	3,150	
Balboa, Canal Zone	22,212	471	19,079	41,762	355	355	344	81,747	1,751	378	14	
Central America and Mexico.....	343,019	317	106,664	450,000	4,130	35,855	4,130	450,000	16,148			
Hawaiian Islands.....												
Total, North America.....	3,995,644	179,862	526,289	4,701,795	21,385	10,441	83,091	665,614	5,482,356	2,550,729	223,475	30,686
West coast, South America:												
Chile.....	1,808,939	278,555	148,361	2,255,855	2,252	53	6,033	25,687	2,270,570	237,559	107,890	4,872
Colombia.....	19,723	—	19,723	—	—	87,607	—	107,330	2,823	193		
Ecuador.....	28,271	—	28,271	—	—	48,747	—	77,039	33,300	1,205		
Peru.....	105,533	—	105,533	269,441	—	2,320	108,128	485,482	310,657	96,280	20,577	
South America ²	117	—	117	—	—	24	1,100	1,301	160			
Total, South America.....	1,962,733	278,555	148,361	2,389,649	271,723	53	145,361	131,936	2,941,722	581,499	205,508	25,551
Australasia:												
Australia.....	93,620	—	130	93,750	92,189	8	8,837	13,006	207,789	23,312	3,524	
New Zealand.....	16,629	—	—	16,629	7,413	—	641	337	25,040	423,976	234	
Australasia ²	46,689	—	—	46,669	6,000	—	—	191	52,860	110,767		
Total, Australasia.....	156,918	—	130	157,048	105,602	8	9,478	13,553	285,689	558,055	3,758	
Asia:												
Philippine Islands.....	930,328	3,087	172,715	1,106,130	—	—	375	985	1,107,490	—	1,543	
China.....	97,243	292	9,817	107,352	—	—	6,320	412	114,084	—	655	
New Zealand.....	262,176	4,210	8,490	274,876	131	—	26,741	2,959	305,245	18,733	10,580	
Far East ²	39,500	—	11,736	51,316	—	—	68	7,766	39,150	20,612		
Total, Asia.....	1,329,307	7,589	202,778	1,539,674	131	—	538	33,504	12,122	1,585,969	40,908	11,185
Grand total.....	7,444,602	486,006	877,558	8,788,166	398,841	11,040	271,434	826,255	10,295,736	3,734,191	443,986	64,137
Percent of total east-bound cargo, 1938.....	42.1	2.6	5.0	49.7	2.3	0.1	1.5	4.6	58.2	21.1	2.5	0.4
Percent of total east-bound cargo, 1937.....	39.9	2.5	5.5	47.9	2.3	0.1	1.7	4.6	57.4	23.0	2.2	0.4
Percent of total east-bound cargo, 1936.....	42.4	2.8	6.3	50.5	2.8	—	1.4	2.5	57.2	23.5	1.9	—

From—	To Europe						To miscellaneous areas				Percent of total east-bound cargo			1936	1937	1938		
	France	Germany	Italy	Netherlands	Spain and Portugal	Sweden	Europe ¹	Total	South America	Egypt	Asia	Africa ³	Grand total	1936	1937	1938		
West coast, North America:																		
United States	7,046	157,388	32,803	171,390	28,578	15,239	Tons	Tons	Tons	Tons	Tons	Tons	Tons	6,805,610	39,7	33,7	38,5	
Canada	18,736	46,885	6,198	40,190	3,752	5	35,951	123,537	1,972,196	38,607	3,850	4,004	50,926	1,464	14,8	15,3	11,1	
Balboa, Canal Zone							2,140	34,116	1,716,157	2,961	—	6,400	24	2,314	—	—	—	
Central America and Mexico	3,661	24,115	43	9,373			5,716	4,385	532	49,968	110	—	—	—	—	—	—	
Hawaiian Islands							5,686	16,734	—	—	—	—	—	131,825	7	7	7	
Total, North America:	207,243	228,388	39,044	220,953	32,330	20,960	43,062	158,185	3,755,055	41,678	3,850	10,404	75,390	466,734	2,6	3,4	2,6	
West coast, South America:														9,368,733	57,8	53,1	52,9	
Chile	43,512	242,884	46,373	5,105	17,808	2,506	63,806	612,693	1,385,008	547	125,632	—	—	3,781,757	15,9	19,4	21,4	
Colombia	5,545	—	—	—	—	—	—	—	—	8,561	142	—	—	116,033	5	5	6	
Ecuador	61,506	1,393	—	—	—	—	—	—	—	97,706	—	—	—	174,745	9	9	10	
Peru	312,674	106,863	676	83,633	6,864	—	5,715	54,423	1,028,382	2,401	—	—	—	1,516,295	10,4	11,5	8,6	
South America ²							5,715	54,423	1,028,382	2,401	—	—	—	2,259	3	1	—	
Total, South America:	447,692	356,885	47,049	88,758	24,672	2,506	69,555	667,865	2,520,600	3,105	125,632	—	—	5,591,059	28,0	32,4	31,6	
Australia:														242,291	9	1,6	1,4	
Australia	3,508	1,399	—	24	—	—	—	2,725	34,492	—	—	—	—	458,810	2,4	2,3	2,6	
New Zealand	851	2,113	—	1,447	—	—	—	5,149	433,770	—	—	—	—	290,515	1,3	1,6	1,6	
Australia ²	52,963	8,105	—	24,863	—	—	—	22,250	18,677	207,635	—	—	—	—	—	—	—	
Total, Australasia:	57,352	11,617		26,334				22,250	26,551	705,917	—	—	—	—	991,906	4,6	5,6	5,6
Asia:														1,107,490	4,4	4,3	6,3	
Philippine Islands								18,427	10,680	50,994	46	—	—	165,124	2,3	1,5	1,9	
China		6,508	—	2,281	—	—	—	18,427	10,680	50,994	46	—	—	382,228	1,9	2,3	2,2	
Japan		10,701	—	2,198	—	—	—	6,186	12,373	54,555	22,428	—	—	91,124	1,0	.8	.5	
Far East ²								6,186	—	26,798	5,176	—	—	—	—	—	—	
Total, Asia:				4,479				24,613	23,053	132,347	27,650	—	—	—	1,745,966	9,6	8,9	9,9
Grand total:	712,287	617,099	86,093	340,534	57,002	23,466	169,480	875,054	7,113,919	72,433	129,482	10,404	75,390	17,697,364	100,0	100,0	100,0	
Percent of total east-bound cargo, 1938:	4.0	3.5	0.5	1.9	0.3	0.1	0.9	5.0	40.2	0.4	0.7	0.1	0.4	100,0	—	—	—	
Percent of total east-bound cargo, 1937:	4.6	2.6	.5	2.2	.1	.1	.6	5.1	41.4	.2	.7	.7	.3	100,0	—	—	—	
Percent of total east-bound cargo, 1936:	5.0	2.1	.3	1.4	.2	.2	.6	5.8	41.4	.3	.8	.8	.3	100,0	—	—	—	

¹ Includes both local and transit cargo.² General cargo not routed so as to allow segregation between definite countries.³ Other than Egypt.

PRINCIPAL COMMODITIES

Statistics of commodities passing through the Canal are not precise because at the time of transit it is not required that complete manifests of cargo carried by vessels be submitted to the Canal authorities. In lieu of a manifest the master of each vessel is required to submit a cargo declaration, which is a briefly itemized statement, listing the principal items of cargo carried and showing their ports or country of origin and destination. These cargo declarations form the basis of the commodity statistics. There is a natural tendency not to list small miscellaneous shipments but to include them under the head of general cargo; not infrequently no other classification is made of the entire cargoes carried by vessels. Hence, except in the case of commodities commonly shipped in bulk, such as mineral oils carried in tank ships, wheat, lumber, nitrates, etc., aggregate shipments of the various commodities are likely to be in excess of the tonnage reported during the year and shown in the annual summary. Subject to errors arising from this source, the tonnage of the principal commodities shipped through the Canal during the past 4 years is shown in the following table:

Commodity	Fiscal year ended June 30—			
	1935	1936	1937	1938
ATLANTIC TO PACIFIC				
Manufactures of iron and steel.....	<i>Long tons</i> 1,114,189	<i>Long tons</i> 1,379,363	<i>Long tons</i> 1,770,293	<i>Long tons</i> 1,859,087
Scrap metal.....	1,186,061	646,464	1,696,030	999,151
Mineral oils.....	605,595	678,607	794,702	907,440
Metals, various.....	175,066	169,141	379,200	646,679
Paper and paper products.....	347,424	397,196	431,672	422,766
Phosphates.....	255,033	289,870	310,015	328,079
Sulphur.....	208,678	224,734	253,294	297,283
Tinplate.....	199,495	246,902	272,772	237,997
Automobiles.....	131,341	204,996	185,983	207,878
Machinery.....	112,339	137,261	155,206	167,698
Cement.....	103,808	126,596	183,978	153,558
Asphalt and tar.....	113,305	139,864	147,193	151,527
Cotton, raw.....	362,548	331,989	298,300	142,121
Coal and coke.....	97,582	132,956	124,467	137,404
Canned goods (food products).....	121,478	135,627	136,885	133,111
Wood pulp.....	45,222	55,529	105,775	113,180
Chemicals.....	98,997	116,066	119,437	108,861
Ores, various.....	97,502	214,711	120,233	103,902
Textiles.....	96,269	108,733	99,337	94,625
Automobile accessories.....	79,818	100,625	86,289	91,769
Railroad material.....	28,125	61,274	21,986	77,588
Ammonium compounds.....	76,073	137,338	60,141	70,924
Nitrate.....	58,464	103,178	68,078	68,702
Coffee.....	52,670	61,503	44,529	67,641
Liquors and wines.....	60,034	66,130	58,826	64,981
Slag.....	10,203	17,093	50,299	62,546
Soda and sodium compounds.....	25,909	37,255	50,888	61,948
Agricultural implements.....	32,037	36,556	47,456	59,838
Glass and glassware.....	53,821	65,202	62,226	59,734
Sand.....	31,967	63,992	52,160	56,973
Sugar.....	50,052	94,607	74,185	56,941
Tobacco.....	52,611	51,707	69,407	52,489
Salt.....	53,931	48,485	45,121	45,967
Asbestos.....	23,076	21,535	24,443	45,659
Corn.....	104,783	38,072	40,977	43,630
Lumber and mill products.....	26,776	47,835	46,700	42,025
Potash.....	15,369	43,826	27,290	40,288
Rosin.....	47,527	55,527	57,793	35,304
Paints and varnishes.....	26,265	38,496	38,594	32,480

Commodity	Fiscal year ended June 30—			
	1935	1936	1937	1938
ATLANTIC TO PACIFIC—continued				
Creosote.....	38,395	44,615	34,850	30,657
Fertilizers (unclassified).....	13,304	28,204	23,628	30,296
Oils, vegetable.....	39,434	30,939	26,116	29,341
Clays.....	10,538	14,456	24,929	20,913
All other.....	1,046,694	1,204,844	1,193,919	1,227,579
Total.....	7,529,721	8,249,899	9,895,632	9,688,560
PACIFIC TO ATLANTIC				
Mineral oils.....	4,342,231	3,277,078	3,571,626	2,874,809
Lumber.....	2,165,835	2,764,091	2,748,917	2,850,953
Ores.....	1,080,144	1,496,021	1,851,254	2,126,657
Sugar.....	212,145	1,391,909	1,358,948	1,486,516
Nitrate.....	146,848	1,181,197	1,328,482	1,401,003
Canned goods (food products).....	937,172	1,050,855	1,092,356	991,436
Wheat.....	1,533,056	1,480,157	1,218,581	705,500
Metals, various.....	608,122	599,385	653,250	695,170
Fruit, fresh.....	270,666	336,367	216,770	347,527
Food products in cold storage ¹	363,745	324,092	394,332	334,659
Wood pulp.....	129,771	164,001	140,612	313,969
Fruit, dried.....	261,116	309,096	233,957	291,444
Barley.....	200,030	221,624	166,578	237,137
Flour.....	319,655	337,487	259,389	233,510
Beans, edible, dry.....	130,649	171,444	134,239	175,917
Coffee.....	137,081	158,315	177,209	174,778
Oils, vegetable.....	193,470	221,255	197,000	170,686
Copra.....	102,397	126,591	155,413	163,521
Paper and paper products.....	118,588	131,368	122,894	137,578
Cotton, raw.....	78,282	120,014	114,057	127,473
Wool.....	122,234	161,528	159,586	123,297
Asphalt and tar.....	47,929	52,302	65,058	107,187
Borax.....	94,716	101,012	96,619	89,831
Oats.....	155,881	69,916	100,629	71,576
Oilseed cake and meal.....	76,539	62,657	76,253	63,798
Rubber, raw.....	40,033	98,914	70,536	62,505
Rice.....	81,192	45,614	44,906	57,109
Skins and hides.....	64,123	72,782	72,761	56,346
Bananas.....	40,177	66,153	38,501	53,319
Soybeans.....	433,322	239,860	107,612	52,934
Textiles.....	45,635	42,753	75,652	51,009
Molasses and sirups.....	66,517	132,302	127,351	47,377
Porcelain ware.....	46,152	50,194	51,608	45,934
Phosphates.....	30,405	58,175	39,250	44,933
Fish meal.....	75,593	51,922	37,901	35,866
All other.....	1,028,355	1,087,550	1,002,566	890,800
Total.....	17,779,806	18,255,044	18,212,743	17,697,364

¹ Does not include fresh fruit.

CLASSIFICATION OF VESSELS BETWEEN LADEN AND BALLAST TRAFFIC

The following table summarizes the ocean-going commercial traffic through the Canal during the fiscal year 1938 segregated between laden ships and those in ballast, as well as between tankers, ore ships, passenger ships, general cargo ships, and those not designed to carry cargo, and also between vessels of United States registry and those of all other nationalities:

Classification	Vessels of United States registry			Vessels of foreign registry			Total traffic		
	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total
CARGO AND CARGO-PASSENGER SHIPS									
Tank ships, laden:									
Number of transits.	16	87	102	52	177	229	67	264	331
Panama Canal net tonnage 1	\$0,265	493,279	\$56,544	267,461	1,044,275	1,311,736	347,726	1,537,554	1,885,280
Tolls.	\$78,554	541,90	\$56,096,726	\$270,910,90	\$1,052,040,60	\$1,323,001,50	\$349,465,70	\$1,539,632,50	\$1,889,098,250
Cargo (tons)	115,786	920,447	1,036,233	490,234	2,055,148	2,548,332	606,020	2,978,595	3,584,615
Tank ships, ballast:									
Number of transits.	75	3	143	10	153	218	13	231	
Panama Canal net tonnage 1	\$433,106	15,026	852,863	33,165	886,028	1,285,939	48,191	1,334,109	
Tolls.	\$310,870,05	\$10,818,72	\$321,688,77	\$612,027,24	\$23,897,58	\$635,924,82	\$922,897,29	\$34,716,30	\$957,613,549
Ore ships, laden:									
Number of transits.	64	62	62	16	16	78	78	78	
Panama Canal net tonnage 1	285,373	285,373	285,373	71,486	71,486	356,850	356,850	356,850	
Tolls.	\$304,331,10	\$304,331,10	\$304,331,10	\$71,927,40	\$71,927,40	\$376,258,50	\$376,258,50	\$376,258,50	
Cargo (tons)	1,182,750	1,182,750	1,182,750	352,050	352,050	1,534,800	1,534,800	1,534,800	
Ore ships, ballast:									
Number of transits.	295,721	64	64	16	16	80	80	80	
Panama Canal net tonnage 1	\$213,849,09	295,721	71,411	71,411	71,411	367,132	367,132	367,132	
Tolls.	\$213,849,09	\$213,849,09	\$51,120,72	\$51,120,72	\$51,120,72	\$264,969,81	\$264,969,81	\$264,969,81	
Passenger ships, laden:									
Number of transits.	111	99	210	329	622	440	392	392	
Panama Canal net tonnage 1	993,459	\$75,503	1,869,533	1,902,206	3,595,182	2,896,056	2,568,479	2,568,479	
Tolls.	\$693,886,55	\$581,926,80	\$1,275,823,35	\$1,557,301,80	\$2,390,437,10	\$2,251,198,35	\$1,955,082,10	\$1,955,082,10	
Cargo (tons) ballast:	299,700	423,556	723,256	985,071	1,551,080	2,536,151	1,284,771	1,974,636	3,259,407
Passenger ships, ballast:									
Number of transits.	607	619	1,226	4	4	4	4	4	
Panama Canal net tonnage 1	3,143,258	3,172,472	6,315,730	5,099,919	5,233,036	10,362,985	8,243,207	8,435,508	8,435,508
Tolls.	\$2,671,102,95	\$2,769,792,15	\$5,440,895,10	\$4,228,277,35	\$4,400,830,10	\$8,629,107,45	\$7,170,622,25	\$14,070,002,55	\$14,070,002,55
Cargo (tons) ballast:	2,635,614	4,314,766	6,950,380	5,162,155	6,894,567	12,056,722	7,797,769	11,209,333	19,007,102
General cargo ships, laden:									
Number of transits.	28	3	31	8	422	442	11	11	
Panama Canal net tonnage 1	101,186	9,675	110,861	1,837,391	1,847,366	1,938,577	19,650	19,650	
Tolls.	\$69,623,28	\$6,831,36	\$76,454,64	\$1,283,342,26	\$6,734,30	\$1,290,076,56	\$1,332,965,54	\$1,332,965,54	\$1,332,965,54

OTHER TYPE VESSELS									
Yachts, ballast:									
Number of transits	3	3	6	1	2	3	4	5	9
Panama Canal net tonnage	1	3,443	3,834	7,277	785	1,603	2,388	4,228	5,437
Tolls		\$2,452,32	\$2,252,16	\$4,704,48	\$565,20	\$1,025,28	\$1,590,48	\$3,017,32	\$3,274,44
Naval vessels:									
Number of transits									
Panama Canal net tonnage									
Tolls									
All other types:									
Number of transits	1								1
Panama Canal net tonnage	1								
Tolls		1,370		1,370				1,370	
		\$685,00		\$685,00				\$685,00	
SUMMARY									
Total cargo and cargo-passenger ships, laden:									
Number of transits	733	867	1,600	1,458	1,677	3,135	2,191	2,544	4,735
Panama Canal net tonnage	1	4,217,373	4,826,627	9,044,000	7,269,616	8,071,773	15,341,389	11,486,989	12,808,400
Tolls		\$3,443,554	3,591,95	\$7,587,146	\$6,056,490	\$6,808,003	\$12,954,493	\$9,500,044	\$11,041,595
Cargo (tons)	3,051,100	6,841,519	9,882,619	6,637,460	10,585,845	17,493,305	9,658,560	17,697,364	\$30,541,639
Total cargo and cargo-passenger ships, ballast:									
Number of transits	167	24,701	173	577	18	595	744	24	768
Panama Canal net tonnage	1	\$30,013	854,714	2,765,201	33,140	2,808,341	3,595,214	67,841	3,663,055
Tolls		\$594,342,42	\$17,650,08	\$611,932,50	\$1,918,957,66	\$30,631,88	\$1,979,589,54	\$48,300,08	\$2,591,582
Total other type ships:									
Number of transits	4	3,443	3,834	7,277	785	1,603	2,388	4,228	5,437
Panama Canal net tonnage	1	1,370		1,370	34,385	21,989	59,374	35,775	9,665
Displacement tonnage			\$2,252,16	\$5,389,48	\$17,737,70	\$13,519,78	\$31,277,48	\$20,895,02	\$15,771,94
Tolls		\$3,137,32							\$36,606,96
Grand total ships:									
Number of transits	904	876	1,780	2,042	1,702	3,744	2,946	2,578	5,524
Panama Canal net tonnage	1	5,050,829	4,855,162	9,905,991	10,035,602	\$8,116,516	18,152,118	15,086,431	28,058,100
Displacement tonnage		1,370	1,370	1,370	34,385	24,989	59,374	35,775	60,744
Tolls		\$4,041,634,04	\$4,163,494,19	\$8,204,528,23	\$8,023,395,41	\$6,942,155,06	\$14,965,360,47	\$12,024,239,45	\$23,169,888,70
Cargo (tons)	3,051,100	6,841,519	9,882,619	6,637,460	10,585,845	17,493,305	9,658,560	17,697,364	\$27,385,924

¹ As determined under the measurement rules in effect prior to Mar. 1, 1938.

LADEN AND BALLAST TRAFFIC BY NATIONALITY

In the table below the ships of each nationality have been segregated to show separate statistics on vessels which were carrying cargo and/or passengers at the time of transiting the Canal and those which passed through in ballast:

Nationality	Number of transits		Panama Canal net tonnage ¹		Tolls	
	Laden	Ballast	Laden	Ballast	Laden	Ballast
British.....	1,014	260	5,971,491	1,293,704	\$5,156,488.25	\$921,018.14
Chilean.....	9	-----	45,920	-----	38,542.20	-----
Chinese.....	2	-----	7,893	-----	7,851.25	-----
Danish.....	187	36	784,117	125,397	623,364.45	83,993.60
Estonian.....	1	1	2,337	2,337	2,448.75	1,682.64
Finnish.....	1	-----	3,575	-----	3,198.60	-----
French.....	97	7	551,302	35,990	448,965.00	25,858.08
German.....	347	9	1,431,026	30,007	1,191,452.45	21,219.12
Greek.....	68	26	306,359	117,257	282,901.30	83,985.08
Honduran.....	11	11	18,692	18,692	20,143.70	13,288.32
Hungarian.....	4	1	15,928	4,001	13,057.50	2,880.72
Italian.....	47	5	336,545	21,380	260,316.50	15,566.76
Japanese.....	292	8	1,785,956	60,359	1,555,877.30	41,430.96
Latvian.....	1	2	2,770	5,540	2,436.30	3,920.40
Netherland.....	270	15	754,900	70,387	620,040.80	49,896.98
Norwegian.....	506	161	2,519,916	769,450	2,046,533.05	535,030.91
Panamanian.....	160	22	270,999	97,886	249,355.70	69,725.52
Peruvian.....	5	-----	9,759	-----	9,802.45	-----
Philippine.....	1	2	5,014	13,551	4,522.50	9,406.80
Soviet.....	5	-----	9,525	-----	9,315.95	-----
Spanish.....	2	-----	9,085	-----	9,416.25	-----
Swedish.....	93	26	455,306	124,266	355,538.05	87,496.49
United States.....	1,600	179	9,044,000	861,991	7,587,146.25	616,696.98
Venezuelan.....	2	2	2,834	2,834	2,857.80	2,041.98
Yugoslavian.....	10	4	40,080	17,691	37,067.35	12,737.52
Total.....	4,735	777	24,385,389	3,672,720	\$20,541,639.70	\$2,597,877.00

¹ As determined under the measurement rules in effect prior to Mar. 1, 1938.

AVERAGE TONNAGE, TOLLS, AND TONS OF CARGO PER CARGO-CARRYING VESSEL

The average measurement tonnage, tolls, and tons of cargo per cargo-carrying vessels of 300 net tons and over (Panama Canal measurement) transiting the Panama Canal during the past 3 years are shown in the following tabulation:

	Fiscal year 1936	Fiscal year 1937	Fiscal year 1938
Measured tonnage:			
Panama Canal net.....	5,220	5,137	5,097
Registered gross.....	6,180	6,036	5,979
Registered net.....	3,665	3,607	3,564
Tolls.....	\$4,377.05	\$4,310.93	\$4,203.75
Tons of cargo (including vessels in ballast).....	4,947	5,255	4,977
Tons of cargo (laden vessels only).....	5,752	6,195	5,784

¹ As determined under the measurement rules in effect prior to Mar. 1, 1938.

NOTE.—Computation of above averages is based on cargo-carrying vessels only; craft not engaged in commerce, such as yachts, naval vessels, etc., are not considered.

STEAM, MOTOR, AND OTHER VESSELS

Of the 5,524 ocean-going commercial vessels transiting the Canal during the fiscal year 1938, 3,296 were steamers, 2,204 motorships, and the remainder, 24, were unclassified naval vessels, yachts, etc. For the past 5 years the proportions of these classes have been as follows:

	1934	1935	1936	1937	1938
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Steamers.....	65.6	65.4	63.7	60.0	59.7
Motorships.....	33.9	33.8	35.8	39.3	39.9
Miscellaneous.....	.5	.8	.5	.7	.4
Total.....	100.0	100.0	100.0	100.0	100.0

Of the 3,296 steamers transiting the Canal during the past fiscal year, 2,396 burned oil and 900 burned coal. For the past 5 years the proportions of each class have been as follows:

	1934	1935	1936	1937	1938
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Oil-burning.....	76.2	74.8	72.9	69.2	72.7
Coal-burning.....	22.6	24.3	27.1	30.8	27.3
Either oil or coal.....	1.2	.9			
Total.....	100.0	100.0	100.0	100.0	100.0

FREQUENCY OF TRANSITS OF VESSELS THROUGH THE PANAMA CANAL

During the fiscal year 1938, 1,558 individual ocean-going commercial vessels, representing 26 nationalities, passed through the Panama Canal. In the aggregate these vessels made a total of 5,524 transits. The number of transits made by individual ships varied from 1 to 93 and averaged 3.55. The greatest number, amounting to 93, was made by the small Panamanian steamer *Istmo*, plying between Cristobal and the west coast of Colombia.

Although vessels of United States registry led in the number of transits during the year, Great Britain, which ranked second, was first in the number of individual vessels, with 541. There were 337 individual vessels of United States registry which passed through during the year.

The following table shows the number of individual ships, the frequency of transits per vessel, the total transits for the year, and the average number of transits per individual vessel, segregated by nationality:

Vessels making indicated number of transits during fiscal year 1938

The following tabulation shows for the fiscal year 1938 the number of vessels making one or more transits through the Panama Canal, the percent which each class formed of the total number of vessels (1,558), their aggregate number of transits, and their percent of the total ocean-going commercial transits (5,524):

Number of transits	Number of vessels	Percent of individual vessels (1,558)	Total number of transits	Percent of total Canal transits (5,524)	Number of transits	Number of vessels	Percent of individual vessels (1,558)	Total number of transits	Percent of total Canal transits (5,524)
1-----	493	31.6	493	8.9	16-----	1	0.1	16	0.3
2-----	369	23.6	738	13.3	17-----	3	.2	51	.9
3-----	162	10.4	486	8.8	18-----	4	.3	72	1.3
4-----	133	8.5	532	9.6	19-----	3	.2	57	1.0
5-----	77	4.9	385	7.0	23-----	1	.1	23	.4
6-----	122	7.8	732	13.3	26-----	3	.2	78	1.4
7-----	74	4.7	518	9.4	31-----	1	.1	31	.6
8-----	15	2.8	360	6.5	32-----	1	.1	32	.7
9-----	30	1.9	270	4.9	34-----	1	.1	34	.6
10-----	13	.8	130	2.4	47-----	1	.1	47	.9
11-----	6	.4	66	1.2	58-----	1	.1	58	1.0
12-----	4	.3	48	.9	61-----	1	.1	61	1.1
13-----	2	.1	26	.5	93-----	1	.1	93	1.6
14-----	3	.2	42	.8	Total	1,558	100.0	5,524	100.0
15-----	3	.2	45	.8					

GROSS TONNAGE OF VESSELS

The 5,524 ocean-going commercial vessels which transited the Canal in the fiscal year 1938 included 5,512 merchant vessels, yachts, etc., paying on the basis of net tonnage, and 12 vessels paying tolls on the basis of displacement tonnage. Of the 5,512 merchant vessels, yachts, etc., 2,285, or 41.5 percent, were vessels of from 4,000 to 6,000 registered gross tons. Vessels between 6,000 and 8,000 tons made up 25.2 percent of the total and those from 8,000 to 10,000 tons, 11.5 percent. Vessels under 2,000 tons accounted for 10.6 percent of the total, while those of 10,000 tons and over represented 6.0 percent. The average registered gross tonnage of all transits was 5,972, as compared with 6,072 for the previous year, a decrease of 1.6 percent.

The following tabulation shows the ocean-going commercial vessels, excluding those based on displacement tonnage, in groups according to registered gross tonnage, segregated by nationality, with average tonnages for 1938 and 1937 and group percentages for the past year:

Segregation of transits by registered gross tonnage of vessels, fiscal year 1938

Nationality	Average registered gross tonnage per vessel, fiscal year										Registered gross tonnage	1937	1938
	Under 2,000	2,000 to 3,999	4,000 to 5,999	6,000 to 7,999	8,000 to 9,999	10,000 to 11,999	12,000 to 13,999	14,000 to 15,999	16,000 to 17,999	18,000 to 19,999			
British	58	26	605	282	164	63	14	34	25	-----	3	1,274	8,528,886
Chinese	-----	1	4	5	1	-----	-----	-----	-----	9	2	10,025	59,041
Costa Rican	84	25	65	16	8	25	-----	-----	-----	-----	223	985,962	4,421
Danish	2	1	-----	-----	-----	-----	-----	-----	-----	2	1	6,396	3,943
Estonian	-----	24	52	23	3	-----	-----	-----	-----	1	1	4,746	3,939
Finnish	2	21	81	103	33	1	-----	-----	-----	1	104	720,290	6,941
French	1	3	77	13	-----	-----	-----	-----	-----	1	1	356	1,701,376
German	115	21	81	103	33	1	-----	-----	-----	1	94	489,982	4,777
Greek	-----	1	22	77	13	-----	-----	-----	-----	-----	22	58,475	5,136
Honduran	-----	3	2	-----	-----	-----	-----	-----	-----	-----	5	20,460	3,938
Hungarian	-----	6	22	4	20	-----	-----	-----	-----	-----	5	434,283	8,499
Italian	-----	1	41	188	67	1	-----	-----	-----	1	52	2,166,163	8,352
Japanese	-----	3	43	20	31	13	-----	-----	-----	1	300	1,770,376	7,221
Latvian	167	10	85	118	73	2	-----	-----	-----	1	3	9,612	3,204
Netherlands	13	14	17	8	7	15	2	-----	-----	1	285	914,771	4,197
Norwegian	119	14	4	2	-----	-----	-----	-----	-----	1	607	3,643,322	5,491
Panamanian	-----	-----	4	2	-----	-----	-----	-----	-----	1	182	504,187	3,946
Peruvian	-----	-----	2	-----	-----	-----	-----	-----	-----	1	5	14,260	2,155
Philippine	-----	5	1	-----	-----	-----	-----	-----	-----	1	3	21,463	2,852
Polish	-----	13	71	559	222	20	12	31	14	25	-----	7,285	7,154
Soviet	1	42	838	-----	-----	-----	-----	-----	-----	-----	5	1,351	1,561
Spanish	-----	1	1	-----	-----	-----	-----	-----	-----	-----	5	13,252	2,650
Swedish	27	4	11	2	-----	-----	-----	-----	-----	-----	2	12,389	6,195
United States	-----	1	11	2	-----	-----	-----	-----	-----	-----	118	926,474	7,785
Venezuelan	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1	11,591,450	6,511
Yugoslavian	-----	-----	-----	-----	-----	-----	-----	-----	-----	4	4	9,714	2,012
Total	586	287	2,285	1,390	632	166	28	65	40	28	5	5,512	32,918,177
Percent of total	10.6	5.2	41.5	25.2	11.5	3.0	0.5	1.2	0.7	0.5	0.1	100.0	-----

¹This group includes the following: British, *Empress of Britain*, 42,348 tons; *Tetje Viken*, 20,638 tons; and *Franconia*, 20,175 tons; German, *Columbus*, 32,565 tons; and Netherlands, *Rotterdam*, 24,119 tons.

²112 vessels paying tolls on displacement tonnage—7 British, 2 Cuban, 1 French, 1 German, and 1 United States—are not included.

SUMMARY OF PASSENGER MOVEMENT AT CANAL DURING 1938

The following tabulation shows by months the number of passengers, exclusive of transients, disembarking at Canal Zone ports during the fiscal year 1938, segregated as between first-class and all others, with comparative totals for the fiscal years 1936 and 1937:

	Disembarking			Embarking		
	First class	Others	Total	First class	Others	Total
July	1,878	2,206	4,084	1,806	2,258	4,064
August	1,694	1,554	3,248	1,803	1,346	3,149
September	1,952	2,041	3,993	1,745	1,789	3,534
October	1,779	2,049	3,828	1,670	2,134	3,804
November	1,585	1,944	3,529	1,227	1,932	3,159
December	1,649	1,199	2,848	1,295	1,296	2,591
January	2,112	1,305	3,507	1,194	1,081	2,275
February	1,500	2,468	3,977	1,939	1,427	3,366
March	1,205	1,677	2,882	1,650	2,048	3,698
April	1,338	998	2,336	1,731	1,574	3,305
May	1,150	1,991	3,141	2,033	1,268	3,301
June	1,451	2,262	3,713	1,495	1,147	2,642
Total, 1938	19,302	21,784	41,086	19,588	19,300	38,888
Total, 1937	19,128	18,931	38,062	19,936	18,082	38,018
Total, 1936	19,600	15,135	34,735	19,862	14,289	34,151

As compared with 1937, the fiscal year 1938 showed an increase of 7.9 percent in the number of arrivals, and in comparison with 1936 it showed an increase of 18.3 percent; in the number of departures there was an increase of 2.3 percent over 1937 and 13.9 percent over 1936.

The following table shows the passenger traffic through the ports of Cristobal and Balboa during the past 3 years:

	Port of Cristobal			Port of Balboa		
	1936	1937	1938	1936	1937	1938
Passengers disembarking	23,811	25,263	28,620	10,924	12,799	12,466
Passengers embarking	22,267	24,860	26,474	11,884	13,158	12,414

A further segregation of the passenger movement shows that 30,685 incoming and 28,215 outgoing passengers came from or were destined to ports of the Atlantic, and 10,401 incoming and 10,673 outgoing passengers were brought from or were destined to ports of the Pacific.

TRANSIENT PASSENGERS

In addition to the figures shown above of passengers disembarking and embarking, there were 131,837 transient passengers brought to the Isthmus by vessels calling at Canal ports during the fiscal year 1938. For the fiscal year 1937, there were 136,085, and in the fiscal year 1936 there were 132,590. The number in 1938 decreased 4,248, or 3.1 percent, in comparison with those in 1937, and registered a loss of

753, or 0.6 percent, under 1936. Most of these passengers came ashore for short periods but since they departed on the same vessels on which they arrived they are not included in the tabulation of passengers ending or beginning voyages at the Isthmus. The origin and destination of these transient passengers are indicated in the following tabulation:

	Fiscal year 1936	Fiscal year 1937	Fiscal year 1938
Remaining on board vessels transiting Canal:			
Atlantic to Pacific-----	56,001	55,149	54,872
Pacific to Atlantic-----	40,117	41,268	41,947
Remaining on board vessels entering port but not transiting Canal:			
Atlantic to Atlantic-----	33,788	36,930	33,914
Pacific to Pacific-----	2,684	2,738	1,104
Total-----	132,590	136,085	131,837

The transient passengers included a number visiting the Canal as members of special tourist cruises. Many of these crossed the Isthmus by train from Colon to Gatun, proceeding from there through the Gaillard Cut to Pedro Miguel by small steamer, and finally completing the trip to Balboa by rail or automobile. Similar combination trips were made in the opposite direction. During the past year 51 trips of these types were conducted, for a total of 8,085 passengers.

INAUGURATION OF NEW RULES OF MEASUREMENT AND RATES OF TOLL

On August 24, 1937, Congress enacted legislation (Ch. 752, 50 Stat. 750; U. S. Code, title 48, sec. 1315) which had the effect of abolishing the application of the United States rules of measurement of vessels as a factor in determining Panama Canal tolls, and of establishing the Panama Canal rules for measurement as the sole means of determining the tonnage of vessels for tolls for the use of the Panama Canal. The legislation, which became effective March 1, 1938, provides as follows: Tolls on merchant vessels, Army and Navy transports, colliers, hospital ships, supply ships, and yachts, shall be based on net vessel-tons of 100 cubic feet each of actual earning capacity determined in accordance with the Rules for the Measurement of Vessels for the Panama Canal prescribed by the President as may be modified by him from time to time by proclamation, and tolls on other floating craft shall be based on displacement tonnage: *Provided*, That the basic rules of measurement shall not be changed except after public hearing and 6-month public notice of such change. The rate of tolls on laden vessels shall not exceed \$1, nor be less than \$0.75 per net vessel-ton as determined under the aforesaid rules, and on vessels in ballast without passengers or cargo the rate may be less than the rate of tolls for vessels with passengers or cargo. In addition to the tolls based on measurement or displacement tonnage, tolls may be levied on passengers at rates not to exceed \$1.50 for each

passenger. The levy of tolls is subject to the provisions of article XIX of the convention between the United States of America and the Republic of Panama, entered into November 18, 1903, and of article I of the treaty between the United States of America and the Republic of Colombia, proclaimed March 30, 1922.

On August 25 and 31, 1937, the President, by virtue of authority vested in him, issued the necessary proclamations prescribing and proclaiming the rates of toll to be paid by vessels using the Panama Canal and the Rules for the Measurement of Vessels to determine their tonnage as a basis for toll charges. The rates thus prescribed are as follows:

(1) On merchant vessels, yachts, Army and Navy transports, colliers, hospital ships, and supply ships, when carrying passengers or cargo, ninety (90) cents per net vessel-ton of 100 cubic feet of actual earning capacity—that is, the net tonnage determined in accordance with the Rules for the Measurement of Vessels for the Panama Canal;

(2) On vessels in ballast, without passengers or cargo, seventy-two (72) cents per net vessel-ton;

(3) On other floating craft, including warships, other than transports, colliers, hospital ships, and supply ships, fifty (50) cents per ton of displacement.

In accordance with the prescribed legislation and Presidential proclamations, the new rules and toll rates were placed in effect on March 1, 1938. In the new measurement rules certain exemptions are made which have the effect of reducing tonnage on which tolls are paid as compared with the tonnage under the measurement rules which were in effect prior to March 1, 1938. Figures for the 4 months, March to June, indicate that the Panama Canal net tonnage, as determined under the new rules, is about 7.5 percent less than if determined under the rules in effect prior to March 1, 1938, and that tolls are about 3.5 percent less. These changes are substantially those which were anticipated before the legislation was enacted. The new system is operating very satisfactorily, and, although the revenue from tolls is somewhat reduced at present, the future income is not subject to reduction through interpretation of rules or by vessel construction or alteration, as was the case under the former system.

CANAL OPERATION AND MAINTENANCE

HOURS OF OPERATION

Dispatching of ships through the Canal is conducted on schedules. Vessels awaiting transit begin moving through the Canal from the terminal ports at 6 a. m. and dispatches are made thereafter from each terminus at intervals of about half an hour. The following is a summary of the arrangements in effect at the end of the fiscal year:

From Cristobal Harbor, first ship at 6 a. m., last at about 3:30 p. m.; from Balboa anchorage, first ship at 6 a. m., last at 2:30 p. m. This applies to vessels averaging 10 to 12 knots. In case a vessel is

capable of 15 knots, departure may be made up to about 3 p. m. from Balboa and 4 p. m. from Cristobal.

Tankers with inflammable cargoes are dispatched at the discretion of the captain of the port and are not permitted to proceed unless they can clear Gaillard Cut before dark. Heavy tankers carrying gasoline cargo are usually restricted to the early morning schedules, leaving at 6, 6:30, and 7 a. m., but may be dispatched on other schedules, if the conditions of traffic necessitate a change.

The volume of traffic at present is not sufficient to justify 24-hour operation.

OPERATING SCHEDULES OF LOCKS

At the end of the fiscal year, the schedules of operating shifts of the locks were as follows:

Gatun:

- 7 a. m. to 3 p. m.—8 locomotives.
- 7 a. m. to 3 p. m.—6 locomotives.
- 3 p. m. to 11 p. m.—8 locomotives.
- 3 p. m. to 11 p. m.—6 locomotives.

Pedro Miguel:

- 8 a. m. to 4 p. m.—8 locomotives.
- 9:30 a. m. to 5:30 p. m.—6 locomotives.
- 2 p. m. to 10 p. m.—8 locomotives.

Miraflores:

- 7 a. m. to 3 p. m.—8 locomotives.
- 9:30 a. m. to 5:30 p. m.—8 locomotives.
- 3 p. m. to 11 p. m.—8 locomotives.

LOCKAGES AND LOCK MAINTENANCE

Lockages and vessels handled are shown in the following table by months for the past fiscal year with corresponding totals for the past five years:

Month	Gatun		Pedro Miguel		Miraflores		Total	
	Lockages	Vessels	Lockages	Vessels	Lockages	Vessels	Lockages	Vessels
1937								
July.....	475	592	485	607	481	602	1,441	1,801
August.....	513	647	529	633	524	633	1,566	1,913
September.....	452	607	468	575	464	571	1,384	1,753
October.....	465	594	486	608	483	600	1,434	1,802
November.....	443	555	470	599	466	592	1,379	1,746
December.....	451	589	471	600	463	575	1,385	1,764
1938								
January.....	467	616	480	615	476	603	1,423	1,834
February.....	431	575	453	588	448	586	1,332	1,749
March.....	517	678	533	655	529	663	1,579	1,996
April.....	486	661	511	673	511	659	1,508	1,996
May.....	491	636	507	639	501	629	1,499	1,904
June.....	460	632	477	628	467	603	1,404	1,863
Total.....	5,651	7,385	5,870	7,420	5,813	7,316	17,334	22,121
Fiscal year:								
1933.....	4,380	5,334	4,557	5,536	4,505	5,586	13,442	16,456
1934.....	5,365	6,593	5,507	6,745	5,483	6,705	16,355	20,043
1935.....	5,316	6,893	5,490	6,859	5,481	6,837	16,257	20,589
1936.....	5,334	6,755	5,548	6,930	5,538	6,866	16,420	20,551
1937.....	5,504	7,156	5,735	7,474	5,608	7,218	16,847	21,848

The lock-operating machinery functioned smoothly throughout the year except for a few incidents due to faulty operation or minor failure of equipment. The following summary includes all delays to vessels while transiting the locks, due to the incidents mentioned:

Locks	Number of vessels delayed	Aggregate delay caused all vessels
Gatun.....	16	1 hour 24 minutes.
Pedro Miguel.....	5	42 minutes.
Miraflores.....	17	3 hours 11 minutes.
Total.....	38	5 hours 17 minutes.

The average number of lockages made daily, and the average number of vessels handled per lockage, during each of the past 5 fiscal years, are shown in the table following:

Fiscal year	Average number of lockages per day			Average number of vessels handled per lockage		
	Gatun	Pedro Miguel	Miraflores	Gatun	Pedro Miguel	Miraflores
1934.....	11.7	15.1	15.0	1.23	1.22	1.22
1935.....	15.6	15.0	15.0	1.30	1.25	1.25
1936.....	14.6	15.2	15.1	1.27	1.25	1.24
1937.....	15.1	15.7	15.4	1.30	1.30	1.29
1938.....	15.5	16.1	15.9	1.31	1.26	1.26

POWER FOR CANAL OPERATION

The power system was operated throughout the year with a combined generator output of 83,443,651 kilowatt-hours as compared with a combined generator output of 80,047,238 kilowatt-hours for the preceding fiscal year. During the year, 75,970,841 kilowatt-hours were distributed to consumers, as compared with 73,255,156 kilowatt-hours for the preceding year. From the above there resulted a transmission, transformation, and distribution loss of 7,472,810 kilowatt-hours, or 8.95 percent, compared with a loss of 6,792,082 kilowatt-hours, or 8.49 percent, for the preceding year. The maximum peak load carried on the system during the past fiscal year was 20,700 kilowatts, occurring on December 9, 1937, at 10 a. m.

The Madden hydroelectric generating station operated throughout the year, generating approximately 56.5 percent of the total power output. The Gatun hydroelectric station generated approximately 43.4 percent of the total power output, while the Miraflores Diesel-electric generating station generated 0.1 percent of the total power output. The amounts of water consumed for generation of power were 436 cubic feet per kilowatt-hour at Madden station and 851 cubic feet per kilowatt-hour at Gatun station. The Miraflores Diesel-

electric generating station was maintained throughout the year on a full-time, stand-by basis. Load, for short periods of time, was carried by this station on 12 occasions during the year.

There were 15 failures of transmission line service, in whole or in part. Nine of these failures were caused by insulator flash-overs, three were caused by animals contacting line, two were caused by locomotive crane contacting line, and one was caused by mechanical failure of insulator string.

The work of modernizing the excitation system at the Gatun hydroelectric station was completed during the year. The results of this improvement are very satisfactory, the advantages being greater reliability, reduction of losses, and simplification of control. Work was started and advanced to about 65 percent completion in the relocation of certain 6.6-kilovolt feeders, which will insure greater reliability in service.

Numerous improvements were made in the substations, all type K-12 switch gear being eliminated from Cristobal substation. The operation and maintenance of the Darien substation were discontinued as a unit of the power system on January 1, 1938. A new 25-kilowatt transformer was installed for street lighting at Balboa substation. Included in the maintenance and patrolling of the transmission lines during the year were the systematic testing and replacing of high-voltage insulators, resulting in a total of 207 strings of insulators being replaced. A number of towers were repainted between Paraíso and Balboa and between Summit and Madden Dam. The replacement of ground wires south of Gamboa was completed during the year. A total of 80 cantilever brackets was recovered from the abandoned section of the transmission line between Paraíso and Summit, to be repaired and used in replacing a number of deteriorated brackets now in use. The underground distribution system for Gamboa town site was extended to serve the light, power, and telephone requirements of the 1938 building program.

For the first 6 months of this fiscal year the electric light and power system continued to earn not only the required 3 percent return on capital invested but a reasonable margin over this amount. Effective January 1, 1938, the tariff rate for electric current, consumed in excess of 100,000 kilowatt-hours per month on individual services, was reduced, so that for the last 6 months of the fiscal year the excess over the required 3 percent on invested capital was practically eliminated. This resulted in a total saving to the large power consumers of \$44,626 for the 6 months' period, of which \$32,843 was saved for Panama Canal and Railroad divisions and \$11,783 for the United States Army and Navy.

These results have been made possible by the continually increasing sale of electric power, mainly to the employees of the Canal and Railroad and to the Army. The following amounts of revenue from the sale of electric current to employees show the increased consumption by employees of the Panama Canal and Panama Railroad:

Fiscal year	Revenue received	Fiscal year	Revenue received
1929.....	\$77,900	1935.....	\$149,601
1931.....	90,059	1936.....	165,592
1932.....	128,568	1937.....	180,347
1933.....	114,539	1938.....	197,374
1934.....	138,213		

In this connection it is to be kept in mind that the installation of electric ranges and waterheaters as standard equipment for family quarters was initiated during the fiscal year 1931.

WATER SUPPLY

The inflow of water into Gatun Lake from all sources during the year and the utilization and losses of the water in the lake are summarized in the following table. There are also shown the percentages which each item formed of the total inflow or yield of the 1,320 square miles of the Gatun Lake drainage basin. The data are presented for the fiscal years 1937 and 1938 for the purpose of comparison. Each year covers 12 months ending June 30, and thus embraces the cycle of both a dry and a rainy season.

	Billion cubic feet, fiscal year		Percent of total yield, fiscal year	
	1937	1938	1937	1938
Run-off upstream from Madden Dam.....	69.16	104.94	36.0	35.9
Yield from land area downstream from Madden Dam.....	84.56	139.59	44.1	47.7
Direct rainfall on Gatun Lake surface.....	38.27	47.89	19.9	16.4
Total yield.....	191.99	292.42	100.0	100.0
Evaporation from lake surfaces.....	22.21	21.87	11.6	7.5
Gatun Lake lockages.....	40.50	41.41	21.1	14.2
Gatun hydroelectric power.....	31.00	31.11	17.7	10.6
Gatun spillway waste.....	77.21	194.41	40.2	66.5
Increase in storage.....	16.09	1.97	8.4	.6
Leakage and inimunicipal.....	1.98	1.62	1.0	.6
Total yield.....	191.99	292.42	100.0	100.0

The 1938 total yield of 292.42 billion cubic feet represents an average inflow of 9,247 cubic feet per second, which is 39 percent above the 24-year annual average of 6,630 cubic feet per second. Operation of the Gatun spillway during the fiscal year 1938 totaled 5,007 gate-hours and of the Miraflores spillway, 617 gate-hours.

DRY SEASON—1938

From a water supply standpoint, the 1938 dry season began January 8 and ended April 27, with a duration of 110 days. This is 20 days less than the 25-year average dry season which begins December 29 and ends May 7. The total yield of the Gatun Lake drainage basin during the dry season period averaged 1,528 cubic feet per second. Evaporation from Madden and Gatun Lake surfaces amounted to 965 cubic feet per second, leaving a net yield of 563 cubic feet per second available for useful purposes. This is 36 percent below the 25-year dry season average net yield, and provided 23 percent of the necessary water requirements for the dry season period. Necessary draft on reserve storage in Madden and Gatun Lakes lowered lake levels to minimum elevations of 208.32 feet on April 26 for Madden Lake and 84.01 feet on April 2 for Gatun Lake

FLOODS

The unusually heavy rains of early December produced flooded conditions over the entire Gatun Lake drainage basin, and the only large flood of the calendar year 1937 over the Madden Lake area. Flood crests occurred on December 4, with a maximum 24-hour inflow of Madden Lake of 48,200 cubic feet per second. The 1938 dry season was terminated by unusually large freshets over the Madden Lake area for this season of the year. Flood crests occurred on April 30 with a maximum 24-hour inflow into Madden Lake of 27,100 cubic feet per second.

MADDEN LAKE

During the fiscal year 1938 Madden Lake varied in elevation from the maximum of 250.10 feet on August 30 to the dry season minimum of 208.32 feet on April 26. Starting the fiscal year with an initial elevation of 230.44 feet, the lake was allowed to rise until August 30, when it was lowered by drum-gate operations. From September 3 to March 14 all four drum gates were kept at sill elevation of 232 feet and a condition of free flow over the dam existed. During the flood of December 4, the lake rose to elevation 239.60 feet with a maximum spillage over the drum gates of about 28,500 cubic feet per second. Beginning March 15 spilling through needle valves for maintenance of Gatun Lake levels lowered Madden Lake to its dry season minimum. With the beginning of the rainy season the lake was again allowed to rise, attaining sill elevation of 232 feet on May 20, when free flow conditions were reestablished and continued until the end of the fiscal year. The elevation of Madden Lake on June 30 was 234.18 feet.

MADDEN DAM

Special tests for leakage through ridges in the area which drains to Rio Chilibrillo were made in the early part of the fiscal year. Water mixed with dye was fed into certain exploration holes and samples were taken in springs supposed to be caused by leakage. As a result of these tests certain weirs will be abandoned and further clay grouting will be delayed until more apparent need for it develops.

Madden Lake was raised to elevation 250 feet and tests were conducted during August and September 1937, to obtain various data relative to the drum gate and to pressures on portions of the spillway. Annual checks were made on erosion of the Chagres River, particularly those sections immediately downstream from the spillway apron and the power station. Tests of uplift in Madden Dam were carried on. To make these tests two new uplift pressure wells were drilled into the foundations of the dam by boring about 60 feet downward from the sluiceway gate gallery. Other tests and inspections were carried on during the year covering the settlement and deflection of Madden Dam, settlement of saddle dams, sluiceway tests, and chemical analyses of Madden Lake water and of weir-pool water. A patrol for leaks on the dry sides of the Chilibrillo and Madronal Rivers was carried out when the lake reached new high levels.

MAINTENANCE OF CHANNEL

Dredges were at work throughout the year dredging and maintaining the Canal channel and terminal harbors for the entire Canal from deep water of the Atlantic entrance to deep water in the Pacific. In addition, work on the various authorized special maintenance projects was continued. Excavation during the year is summarized in the following tables:

Location	Maintenance		
	Earth	Rock	Total
CANAL PRISM DREDGING			
Gatun Lake.....	Cubic yards 35,200	Cubic yards 56,800	Cubic yards 92,000
Gaillard Cut:			
Ordinary channel maintenance.....	483,900	1,181,500	1,665,400
Special project No. 13.....	126,500	150,700	277,200
Miraflores Lake.....	1,751,900	152,600	1,907,500
Pacific entrance:			
Ordinary channel maintenance.....	1,980,500	56,100	2,036,600
Project No. 1-B.....	133,800	27,300	161,100
Total Canal prism.....	4,514,800	1,625,000	6,139,800
AUXILIARY DREDGING			
Cristobal Outer Harbor: Special project No. 11 (maintenance).....	36,800	215,200	252,000
Cristobal Inner Harbor: Special project No. 12.....	7,300	43,700	51,000
Balboa Inner Harbor: Ordinary maintenance.....	2,073,700	116,200	2,189,900
Camarón Culvert (Miraflores Lake).....	900	1,100	2,000
Total auxiliary dredging.....	2,118,700	376,200	2,494,900
Grand total.....	6,633,500	2,001,200	8,634,700

¹ Does not include 89,500 cubic yards of rehandled material.

² In addition 5,850 cubic yards of Chamé sand were produced by the craneboat *Atlas*.

Dredging operations in the Canal are divided into three major districts: The northern district, from contour 42 feet below mean sea level in the Atlantic Ocean to Gamboa; the central district, Gaillard Cut, from Gamboa to Pedro Miguel Locks; the southern district, from Pedro Miguel Locks to contour 50 feet below mean sea level in the Pacific Ocean. Excavation in these three districts is summarized as follows:

	Northern	Central	Southern	Total
Canal prism:				
Earth.....	Cubic yards 35,200	Cubic yards 610,400	Cubic yards 3,869,200	Cubic yards 4,514,800
Rock.....	56,800	1,332,200	236,000	1,625,000
Total.....	92,000	1,942,600	4,105,200	6,139,800
Auxiliary:				
Earth.....	44,100	0	2,074,600	2,118,700
Rock.....	258,900	0	117,300	376,200
Total.....	303,000	0	2,191,900	2,494,900
Total:				
Earth.....	79,309	610,400	5,943,800	6,633,500
Rock.....	315,700	1,332,200	353,300	2,001,200
Grand total.....	395,000	1,942,600	¹ 6,297,100	8,634,700

¹ 89,500 cubic yards rehandled material not included.

ORDINARY CHANNEL MAINTENANCE

Northern district (Atlantic entrance, Cristobal Harbor, and Gatun Lake).—There was no maintenance work performed in the Atlantic entrance or Cristobal Harbor during the year. Maintenance dredging in Gatun Lake was in progress during the year with the dipper dredges *Gamboa* and *Paraíso*, and with the crane boat *Atlas* working with a clamshell bucket. These craft worked 9½, 30, and 2½ days, respectively, removing a total of 92,000 cubic yards of earth and rock.

Central district (Gaillard Cut).—Maintenance dredging in Gaillard Cut, exclusive of slide excavation, amounted to 363,300 cubic yards of earth and rock. The three dipper dredges worked a total of 142 days during the year in accomplishing the work.

Southern district (Pacific entrance, Balboa Harbor, and Miraflores Lake).—Maintenance dredging in the Pacific entrance was performed by the suction dredge *Las Cruces* and the crane boat *Atlas*, which operated both as a drag suction dredge and with clamshell bucket. The former worked 108 days, excavating 1,939,800 cubic yards. The crane boat *Atlas* worked 41 days, removing 96,800 cubic yards, 2,300 yards of which were removed from the East Ferry slip. Maintenance dredging in the Balboa Harbor consisted of operation of the suction dredge *Las Cruces* a total of 128 days, excavating 2,156,400 cubic yards of material; and operation of the dipper dredge *Gamboa* for a total of 11 days, excavating 33,500 cubic yards of material.

The pipe line suction dredge *Las Cruces* operated a total of 90 days during the year in Miraflores Lake, excavating a total of 1,907,500 cubic yards.

SPECIAL MAINTENANCE PROJECTS

Project No. 1.—This project consists of deepening the Pacific entrance channel from Miraflores Locks to the sea buoys and including the Balboa inner harbor from 45 feet to a ruling depth of 50 feet (mean sea level datum). It was begun in the harbor in July 1924. The total excavation on project No. 1, Pacific entrance, during the past year was 161,100 cubic yards, of which 23,000 cubic yards were anticipated fill. There was no dredging on project No. 1, Balboa Harbor, during the year. At the end of the fiscal year excavation on the Pacific entrance portion of this project was 93.5 percent completed and on the Balboa Harbor portion was 93.9 percent completed. Excavation for the entire project to date has totaled 12,227,750 cubic yards and at the end of the fiscal year this project was 93.5 percent completed.

Project No. 11.—This project, which consists of removing various shoal areas in the outer portions of Cristobal Harbor, as described in detail in the annual report of 1935, was started in September 1934. The total excavation for the fiscal year was 252,000 cubic yards, of which 82,400 cubic yards were anticipated fill. The total excavation to date on this project is 648,150 cubic yards, of which 120,200 cubic yards are anticipated fill. Excavation on this project was 79.3 percent completed at the end of the fiscal year.

Project No. 12.—This project, in Cristobal Inner Harbor, called for the removal of the 18-foot shoal to the west of the coaling station and near the Canal channel to a depth of 25 feet mean sea level, which is the prevailing depth in this vicinity. The removal of this shoal opens this portion of the harbor to navigation for shallow draft vessels leaving the harbor south-bound or entering the harbor north-bound. The total excavation on this project during the past fiscal year was 51,000 cubic yards, of which 14,900 cubic yards were anticipated fill, bringing the total excavation for the completed project to 56,400 cubic yards, of which 16,400 cubic yards were anticipated fill. This project was completed on September 7, 1937, immediately following which the area was thoroughly dragged and a hydrographic survey taken prior to its being opened for shipping.

Project No. 13, Gaillard Cut.—This project, which consists of widening Culebra Reach by 200 feet to the westward, as described in detail in the annual report of 1935, was started in January 1935. The total excavation for the past fiscal year was 277,200 cubic yards, of which 258,060 cubic yards were sluiced material; of this amount 96,000 cubic yards were mined rock. The total excavation to date on this project

is 1,675,250 cubic yards, and the excavation on this project was 21.3 percent completed at the close of the past fiscal year.

SLIDES

The total excavation from slides in Gaillard Cut during the fiscal year amounted to 1,302,100 cubic yards. Culebra slide (west) was the only slide of consequence during the year. This slide was in constant movement throughout the year and on 10 different occasions showed movements of a most pronounced character. The months of February, March, and April, were the only months in which important movement did not occur. The various movements of this slide necessitated practically continuous dredging operations throughout the year. There was no interference with shipping on account of slides during the year.

Details of the excavation from slides during the fiscal year 1938, together with the total material excavated from June 30, 1913, to the end of the past fiscal year, are presented in the following table:

Location	Fiscal year 1938			Total to date		
	Earth	Rock	Total	Earth	Rock	Total
	<i>Cubic yards</i>	Cubic yards	Cubic yards	Cubic yards	Cubic yards	Cubic yards
Haut Obispo slide (east)-----				6,700	5,500	12,200
Buena Vista slide (west)-----				7,000	1,500	8,500
Buena Vista slide (east)-----				12,100	17,550	29,650
Casacadas slide (east)-----				9,250	49,900	59,150
White House slide (east)-----	2,100	3,000	5,100	28,750	44,050	72,800
White House slide (west)-----				21,000	100,550	121,550
Powder House slide (east)-----	10,600	31,300	41,900	115,250	343,450	458,700
La Pita slide (east)-----				12,300	96,700	109,000
La Pita slide (west)-----				4,550	42,900	47,450
Empire slide (east)-----	6,500	9,900	16,400	40,550	237,950	278,500
Division Office slide (west)-----				4,150	19,450	23,600
Empire slide (west)-----						
Lirio slide (east)-----				83,850	161,300	245,150
Lirio slide (west)-----				570,450	1,987,750	2,558,200
Barge repair slide (east)-----				208,750	474,850	683,600
Culebra slide extension (east)-----				422,150	976,200	1,398,350
Culebra slide (west)-----	209,000	793,800	1,002,800	1,839,400	10,808,250	12,647,650
Culebra slide (east)-----	81,400	154,500	235,900	2,773,350	18,132,150	20,905,500
Cuecaracha slide (east)-----				2,492,950	6,851,490	9,344,350
Contractors Hill slide (north)-----				13,800	139,600	153,400
Contractors Hill slide (south)-----				7,900	31,600	39,500
Cuecaracha Signal Station slide-----				35,500	204,600	240,100
Cuecaracha slide (west)-----				56,250	123,800	180,050
Cuecaracha Village slide-----				33,400	77,490	110,800
Paraiso slide (east)-----				1,950	7,250	9,200
Cartagena slide-----				60,800	255,150	315,950
Total-----	309,600	992,500	1,302,100	8,862,100	41,190,800	50,052,900

Numerous small bank breaks and surface movements occurred at various unlisted points throughout Gaillard Cut during the year. One such slide of special importance occurred on June 1, 1938, when a quantity of rock estimated at 2,000 cubic yards sheared off from the face of Gold Hill between the 150 and 200 foot levels and fell into the Canal, causing a shoaling of the channel to 36.0 feet, 75 feet west of

the east prism line. This material was removed by the dredge *Cascadas*. Daily inspections and reports were made of all portions of active slide areas fronting the Canal as well as a periodical inspection of the entire surface of all slides. Monthly observations were taken of reference points on east and west Culebra, east Culebra extension, Cucaracha (east), Cucaracha (south), and Cartagena slides.

SUBSIDIARY DREDGING DIVISION ACTIVITIES

The Chagres River gravel plant at Gamboa shipped 52,572 cubic yards of sand and gravel during the year, leaving a balance on hand of 39,653 cubic yards, as of June 30, 1938. The crane boat *Atlas* made six trips to Chamé, dredging a total of 5,850 cubic yards of sand, which was transported in barges to Balboa and delivered alongside dock No. 7 for the supply department.

The Canal and adjacent waters through Gaillard Cut, Miraflores Lake, and Gatun Lake (including all dump areas) were patrolled and the growth of hyacinths kept under control. Log booms at the mouths of the Chagres and Mandingo Rivers were maintained to prevent hyacinths, logs, floating islands, and other obstructions from entering the Canal channel during freshets or spilling at Madden Dam. During the year periodical inspection trips were made in the Chagres, Mandingo, Frijoles, and Azules Rivers, and along the shores of Barro Colorado Island, Pena Blanca, and Gigante Bays, dumps Nos. 1 to 14, and Miraflores and Red Tank Lakes. Weekly inspection trips were also made of the Canal channel between Gamboa and Gatun.

The bulk of the work of hyacinth extermination was accomplished by means of spraying with a solution of copper sulphate. It is estimated that 8,000,000 plants were destroyed during the past fiscal year by this method. The trash handling plant removed approximately 120,000 plants to be burned during the coming dry season. Weed burner No. 606 was operated to burn grass and hyacinth growths and destroyed an estimated 700,000 plants. This equipment can be operated to advantage in shallow areas where the comparative sparsity of hyacinth growth makes the use of the spray boat uneconomical. The total number of hyacinth plants destroyed by pulling, burning, and spraying during the past fiscal year was estimated at 12,000,000.

An estimated 259 cords of driftwood were picked up along the banks of the Canal in Gaillard Cut and Gatun Lake, and in Pedro Miguel Lake and the Mandingo River. Of this amount, 167 cords came from the Mandingo River, where the old wooden truss highway bridge, which had become a menace to travel on the river, was destroyed. The trash handling plant removed approximately 121 cords of driftwood from the Chagres River.

EQUIPMENT

The following dredges and other floating equipment were in operation during the year: Three 15-yard dipper dredges, *Cascadas*, *Gamboa*, and *Paraiso*, were operated a total of 9.4 months, 2.5 months, and 11.5 months, respectively. The 24-inch pipe-line suction dredge *Las Cruces* was operated for 11.2 months during the year. The crane boat *Atlas* was operated for 1.4 months in general maintenance dredging and in addition made six trips to Chamé for sand, spending the remainder of the year in miscellaneous operations; 2.6 months of this time were spent in reserve or undergoing repairs. Derrick barge No. 157 was in service for 1.4 months dredging material from in front of the Camaron Culvert in Miraflores Lake; placing concrete blocks on the east and west breakwaters at Cristobal; in the service of the municipal engineering division driving piles for the new launch dock at Gamboa; driving piles for the gasoline dock at Gamboa; and performing miscellaneous services. The hydraulic grader No. 4 was in service at project No. 13 for 11½ months and under repairs at Gamboa one-fourth month. The drill boat *Terrier* No. 2 was in continuous service during the year, excepting a total of 30½ days lost because of boiler-washing operations and minor repairs. Air compressor No. 29 was in service 11.5 months during the year at project No. 13. Excavator No. 1 was in service 8.1 months during the year, engaged in grading work for the municipal engineer and for the relocation of the gravel screening plant at Gamboa, and handling gravel; excavator No. 2 was in actual service for 4.7 months in a like capacity. The 250-ton floating cranes *Ajax* and *Heracles* were operated on alternate months except when calls for extra service required the use of both cranes. Three large tugs, the *Trinidad*, *Chagres*, and *Mariner*, and a fourth, the *Gatun*, following its commissioning in January, supplemented by three small tugs, the *Indio*, *Bohio*, and *Siri*, were operated during the year in towing and transportation service, one large tug being out of commission continuously for purpose of repairs. Following the commissioning of the *Gatun*, the *Mariner* was held in reserve. Nine launches were in service during the year. An average of two launches was continuously out of service for repairs. The Diesel ferryboats *President Roosevelt* and *Presidente Amador* were in service in connection with the operation of the Thatcher Highway ferry service at Balboa for 5.1 and 8.0 months, respectively, during the year.

FERRY SERVICE

Ferry service across the Pacific entrance of the Canal, connecting La Boca, Balboa, and Panama City on the east bank of the Canal with Thatcher Highway on the west bank, was operated on a continuous 24-hour basis throughout the year. In the following table

are shown the more important statistics relative to the operation of the ferry for the past 2 fiscal years:

	1937	1938
Single trips made by the 2 ferries.....	30,395	31,720
Vehicles carried:		
Panama Canal vehicles.....	8,697	11,314
United States Army vehicles.....	25,944	39,428
Commercial trucks.....	34,990	41,786
Commercial passenger cars.....	68,015	62,136
Private cars.....	178,461	193,039
Total vehicles carried.....	316,107	347,703
Total passengers carried.....	1,581,400	1,654,080

MARINE ACTIVITIES

AIDS TO NAVIGATION

The maintenance of navigation aids in the Canal and adjacent waters was continued by the lighthouse subdivision. Of the total of 692 aids maintained during this past fiscal year, 296 were electric, 137 gas, and 259 unlighted; this is an increase of 6 electric aids and a decrease of 2 unlighted aids during the year. Two visits were made during the year by the lighthouse tender *Farorite* to the Department of Commerce automatic lighthouses at Morro Puercos and Jicarita Islands, in the Pacific approach, under existing agreement whereby the Panama Canal attends to the maintenance of these lights.

Eight electrically lighted beacons were established in the Manzanillo Bay entrance to Folks River Basin for the benefit of commercial and military amphibian craft using these waters. Tabu Rock, located midway between Taboguilla and Urava Islands in the Pacific, was marked in November 1937 by the establishment of a first-class red and black horizontal-striped spar buoy fitted with red reflector buttons. This buoy is located in 114 feet of water, 50 yards from the rock. The Fairway gas buoy, located about 8 miles off the Atlantic entrance, was permanently discontinued on September 30, 1937, due to the numerous accidents to aids on this station, including the total loss of two buoys. A combination steel and concrete tower and tank-house 33 feet high was constructed at South Fraile light station in July 1937 and placed in service on November 18, 1937. The Bona Island Lighthouse, which is at an elevation 700 feet above sea level, has often been erroneously reported as extinguished. These erroneous reports were probably due to its being temporarily obscured by mists or clouds on account of its height. Plans and specifications were prepared for the relocation of this light at a lower level on Bald Rock, a barren, uninhabited rock immediately adjacent to and separated from Bona Island by a 150-foot channel. Construction work has begun and the establishment of the light on the new location will be completed early in the fiscal year 1939.

ACCIDENTS TO SHIPPING

The board of local inspectors investigated and reported on 23 accidents to shipping in Canal Zone waters during the fiscal year 1938, a summary of which follows with a comparison of accidents in the 2 previous years:

Cause of accident	1936	1937	1938	Cause of accident	1936	1937	1938
Ship struck lock wall.....	9	14	5	Tug damaged by ship.....			1
Struck Canal bank.....		4	4	Ship damaged by dredge.....			1
Ship damaged by tug.....	1	3	4	Explosion and fire.....			1
Struck dock.....	3	7	3	Emergency anchoring.....			1
Collision.....	2	-----	1	Others in previous 2 years.....	12	11	-----
Grounded.....	1	-----	1	Total.....	28	39	23
Struck wall adjacent to dry dock gate.....			1				

SALVAGE AND TOWING

Panama Canal equipment and personnel rendered assistance to disabled and distressed shipping during the year as follows:

Steamship Gypsum Prince.—While transiting the Canal on February 3, 1938, the steamship *Gypsum Prince* when in Gaillard Cut developed steering-gear trouble which caused it to strike the Canal bank with force sufficient to damage the hull seriously. Leaking badly and in a sinking condition, the vessel was beached on the west bank opposite Gamboa. The U. S. S. *Farorite* was engaged in salvage operations on this vessel for 2 days.

Steamship Athina Liranos.—On March 26, 1938, after completing transit of the Canal, this vessel went aground on the west bank of the Canal channel where the Canal opens out into Limon Bay. The U. S. S. *Farorite* was engaged in salvage operations to refloat this vessel for approximately 6 days, it being necessary to remove about 2,000 tons of the wheat cargo.

METEOROLOGY—HYDROLOGY—SEISMOLOGY

Precipitation.—Rainfall in the Canal Zone and vicinity for the calendar year 1937 averaged about 15 percent above normal. The average in the Pacific section was 87.80 inches; in the central section, 113.59 inches; and in the Atlantic section, 165.79 inches. Annual totals at rainfall stations ranged from 82.92 at Balboa to 191.81 inches at Porto Bello. February was the month of least rainfall and December of greatest rainfall. The maximum rainfall in 24 consecutive hours recorded during the calendar year 1937 was 10.26 inches at Cristobal on December 9 and 10.

Air temperatures.—The maximum and minimum temperatures of record at various stations, revised to June 30, 1938, and the annual average temperature for years of record are shown in the following tabulation:

Station	Maximum		Minimum		Annual average	Years of record
	°F.	Date	°F.	Date		
Balboa Heights.....	97	Apr. 7, 1912	63	Jan. 27, 1910 { Feb. 4, 1924 }	78.7	32
Madden Dam.....	98	{ Apr. 13, 1920 May 21, 1925 }	59	Jan. 30, 1929	78.3	27
Gatun.....	95	{ May 4, 1933 Oct. 18, 1924 }	66	Aug. 7, 1912	80.4	27
Cristobal.....	95	May 26, 1925	66	Dec. 3, 1909	80.0	30

¹ Mean of maximum and minimum temperatures. Other means from bihourly values.

During the calendar year 1937 the average air temperature at Balboa Heights was 79.1° F., with monthly means ranging from 77.6 in November to 80.9 in April. The average air temperature at Cristobal was 80.5, with monthly means ranging from 78.9 in November and December to 82.2 in April.

Winds and humidity.—Monthly mean wind velocities on the Pacific coast during the calendar year 1937 ranged from 4.4 miles per hour in September and October to 9.1 miles per hour in March, with a maximum velocity for a 5-minute period of 30 miles per hour from the northwest on December 6. Monthly mean wind velocities on the Atlantic coast ranged from 5.2 miles per hour in September to 13.6 miles per hour in March, with a maximum velocity for a 5-minute period of 34 miles per hour from the northwest on November 3. Northwest winds were most frequent on the Pacific coast and north winds on the Atlantic coast. The mean relative humidity of the atmosphere for the calendar year 1937 was 83 percent on the Pacific coast and 81 percent on the Atlantic coast. Monthly mean relative humidity on the Pacific coast ranged from 74 percent in March to 88 percent in November. Monthly mean relative humidity on the Atlantic coast ranged from 74 percent in April to 87 percent in December.

Tides.—During the calendar year 1937 the following extreme tidal heights occurred at Balboa, the Pacific terminal of the Canal: Highest high water, 10.1 feet above mean sea level on May 12; lowest low water, 11.4 feet below mean sea level on April 12; and greatest range between consecutive tides, 20.4 feet on April 12. At Cristobal, the Atlantic terminal of the Canal, the following extremes occurred: Highest high water, 1.30 feet above mean sea level on November 21; lowest low water, 1.04 feet below mean sea level on December 18; and greatest range between consecutive tides, 1.94 feet on December 18.

Seismology.—Two hundred and seventy-nine seismic disturbances were recorded at the Balboa Heights seismological station during the calendar year 1937. Fifteen of these were generally felt in the Canal Zone, while 85 had epicenters less than 300 miles distant, 11 others

were of distant origin, and the remaining 183 were so slight that no estimate could be made of their epicenters.

One hundred and thirty-four seismic disturbances were recorded during the 6-month period, January to June, inclusive, 1938. Two of these were felt locally. No tremors occurring during the calendar year 1937, or during the 6-month period, January to June 1938, exceeded intensity IV, Modified Mercalli Scale, and none caused any damage locally.

SECTION II

BUSINESS OPERATIONS

The business enterprises carried forward by the Panama Canal and by the Panama Railroad Co. embrace a number of activities which in the United States would normally be carried on by private initiative. These activities have been developed either to meet the needs and demands of shipping passing through the Canal, or to meet the needs of the organization and its force of employees. The business enterprises include those sections of the Canal and Railroad organizations which are engaged in the supplying of fuel, provisions, ship chandlery, and repairs to vessels; the sale of foods, clothing, and other essentials to Canal and Railroad employees; the handling of cargo and allied operations; and the operation and management of the Panama Railroad and of the steamship line operating between New York and the Isthmus.

The Canal and the Railroad are separate organizations, but the administration of both organizations is vested in the Governor of the Panama Canal, who is also President of the Panama Railroad Co.

PANAMA CANAL BUSINESS OPERATIONS

Business operations of the Panama Canal are conducted separately from operating activities pertaining directly to the transiting of vessels, and government of the Canal Zone. The annual appropriation acts for the Panama Canal authorize the use of moneys arising from the conduct of auxiliary business activities with the proviso that any net profit derived from such business activities be covered annually into the Treasury of the United States.

It is the aim to operate the business activities as a whole on a self-supporting basis and to include as a proper charge against business operations a fixed capital charge (with some minor variations) of 3 percent for interest on the investment. In the accounting of profits to be covered into the Treasury, the amount representing charges for interest on investment is a part of the net profits covered into the Treasury and in effect is a reimbursement to the United States Treasury for interest paid by it to holders of United States bonds. The investment in business activities totaled \$30,806,850.84 at the beginning of the fiscal year, and \$31,868,200.83 at the end (tables 4 and 5, sec. V). The capital charge for the fiscal year 1938 was \$766,378.81 (table 20, sec. V). The profits of \$824,612.60 exceeded this amount by \$58,-233.79.

MECHANICAL DIVISION

The mechanical division has jurisdiction over the mechanical and marine shops, drydocks, car shops, and roundhouses at Balboa and Cristobal; the design, construction, and major alteration of hulls and machinery of floating equipment of the Panama Canal, Panama Railroad, and commercial business, except the electrical work; the design and technical matters of the railway rolling stock and of floating craft involving naval architectural subjects for the hulls and marine engineering subjects for the operating machinery; repairs to all equipment, floating and otherwise, of the Canal, Railroad, and commercial business (including merchant shipping) requiring mechanical or marine shop or drydock facilities, except electrical and automotive repairs; railway-car inspection, including repair of rolling stock, hosting, and manning the railway wrecking outfit; the maintenance of inspection services, including tests and repairs (except electrical and marine boilers) for the Canal and Railroad, for passenger and freight elevators, for weighing scales and measuring devices (scales, pumps, and meters), and for clocks, typewriters, and similar instruments; manufacture and distribution of compressed air, acetylene, oxygen, and hydrogen; and the fabrication of such machinery or equipment, floating and otherwise, spare parts, etc., as in the opinion of the Governor may be more economically or expediently made on the Canal Zone than purchased elsewhere.

FINANCIAL

The origin and class of work done by the mechanical division in the fiscal year 1938 and in the previous fiscal year are shown in the following table:

Gross revenue—class and source

	Fiscal year 1937	Percent of total	Fiscal year 1938	Percent of total
Class:				
Marine	\$1,955,172	62.4	\$1,876,607	59.5
Railroad	466,684	14.9	474,637	15.0
Fabricated stock	349,557	11.2	287,752	9.2
Sundries	361,389	11.5	516,926	16.3
Total	3,132,802	100.0	3,155,922	100.0
Origin:				
Panama Canal	1,525,929	48.7	1,338,341	42.4
Panama Railroad	478,992	15.3	496,536	15.7
Other United States Departments	537,336	17.2	376,888	11.9
Outside interests	590,545	18.8	944,157	30.0
Total	3,132,802	100.0	3,155,922	100.0

The total expenses of the mechanical division for the fiscal year amounted to \$3,053,732, which left a net revenue from operations of \$102,190.

The marine work listed above included new construction of vessels for the Canal, overhaul of vessels for the Canal, the United States Navy, and other departments of the United States Government, as well as merchant ship repairs. The increase that may be noted above in work for outside interests was to a large degree the result of extensive repairs to the S. S. *Bennekom*.

DRYDOCKS

During the year 133 drydockings were made at the Balboa and the Cristobal drydocks, further details of which are given in the table below:

Vessels belonging to—	Balboa drydock	Cristobal drydock
Panama Canal Divisions.....	22	5
United States Navy.....	5	23
United States Army.....	3	5
Other Departments of the U. S. Government.....	1	1
Panama Railroad Co.....	1	5
Outside interests.....	34	28
Total.....	66	67

The Balboa drydock was unoccupied only 2 days of the year (neither of which was a working day), while the Cristobal drydock was unoccupied 82 days (of which 34 were working days). Last year the Balboa drydock was unoccupied 32 days and the Cristobal drydock 96 days.

MARINE REPAIR WORK

By far the most important marine repair project of the past year was performed on the S. S. *Bennekom*, of the Royal Netherlands Steamship Line, which had gone aground in June 1937 on Negrillas Rocks, off the west coast of Colombia. This vessel was refloated, towed to Balboa, and placed in the drydock. The damage to this vessel extended over the entire bottom from stem to stern; 80 damaged shell plates were renewed; and an additional 80 shell plates were removed, straightened, faired, and replaced. The renewal and straightening of the internal framing, longitudinals, and inner bottom were of considerably greater magnitude than the work on the shell plating proper. In addition to this, the engine foundation had been unsettled and the shafting had been driven upwards by the grounding, so that the main engine and shafting had to be completely realigned after the vessel was undocked and water borne. The permanent repairs on this vessel necessitated the continuous use of the drydock from July 19 to October 11, 1937. This project was the largest commercial repair project that has been performed by the mechanical division in at least 12 years.

With the exceptions of the S. S. *Bennekom* and the fishing boat M. S. *Taiyo*, which foundered in Panama Bay, repairs to commercial vessels consisted principally of urgent repairs to vessels transiting the Canal or to small craft operating between the Canal ports and nearby ports in Central and South America. Quite a number were of a nature that required the vessel to be placed in drydock, such as a damaged propeller or a broken tail shaft, but the majority of repairs as a rule were not large.

Repairs to vessels of the United States Army were limited to emergency repairs to Army transports and to Army craft based in local waters. Likewise, for the greater part, repairs to vessels of the United States Navy were confined to vessels of the Special Service Squadron and to craft attached to the Submarine Base at Coco Solo. There has been a decline in repairs to the United States Navy submarines at the Cristobal Shops due to the fact that the craft now operating in local waters do not require as extensive periodical overhauls as those formerly stationed here.

Marine repair work performed for foreign governments included principally the drydocking and general overhaul of various transports, destroyers, cruisers, and gunboats for the Canadian, Peruvian, Colombian, Mexican, and Brazilian Governments.

The Diesel-electric tug *Gatun*, designed late in the fiscal year 1936, was completed during the past fiscal year. This tug, with an over-all length of 125 feet 7 inches, was launched on May 11, 1937, and delivered to the dredging division on December 30, 1937, for active service. The total shop cost of this tug was \$430,323.

As facilities were available throughout the year, a number of the units of the dredging and marine divisions were drydocked and overhauled.

WORK OTHER THAN MARINE WORK

The usual amount of light and heavy repairs was afforded locomotives of the Panama Railroad Co. In addition, the Balboa round house overhauled locomotives on a commercial basis for the United States Army and for the marine shops of the mechanical division. Specifications were prepared for purchase in the United States of a two-car gasoline motor light train seating 100. Scrapping of surplus freight cars and salvage from them of spare parts was completed during the past fiscal year.

The manufacture of repair parts in a large and diverse quantity for use in the Atlantic locks during the 1939 overhaul was carried on during the latter half of the year. This was begun at an earlier date than usual to afford employment during a temporary slack work period and to avoid the expense of importing machinists from the United States to assure completion of the work by the time required. A

great deal of mill work, including sash and doors, was manufactured for use in the construction of new quarters and public buildings at the various Canal villages, particularly at the Gamboa town site. Three cylindrical steel fuel oil tanks, 7 feet diameter by 35 feet long, were built for the Cia. Panamena de Fuerza y Luz (light and power company), Panama. An unusually large amount of mahogany logs was sawed into merchantable lumber for local Panamanian lumber dealers and land owners.

During the past fiscal year work was completed on a towing locomotive for the locks division. This order had been given the mechanical division in the fiscal year 1935 as a stand-by job to tide over during slack periods of work.

PLANT IMPROVEMENTS

The new oxy-acetylene plant was made available for maximum production and considered finally completed in February 1938. The former gas plant was renovated and repartitioned to include offices for various mechanical division personnel, a storage and repair room for compressed air hose and fittings, and as a workshop and materials store for marine electricians. A new structure was built to replace the former storehouse for drydock blocking and shores; however, this new building was in use at the close of the fiscal year as a temporary storehouse for rigging stores. A new rigging loft was begun on the site of the old rigging loft in November 1937 and was complete except for minor storage racks and paving at the close of the past fiscal year. It is planned to occupy the building about August 1, 1938.

Numerous new machines for both metal and wood working had been received or were on order at the close of the past fiscal year. A small frequency changer to convert 25-cycle (the only available local current) to 60-cycle had been ordered. This will permit the use of standard 60-cycle wood-working machines. A 20-ton crane was purchased as a replacement at Cristobal, and a three-stage high-pressure air compressor, which had been turned over to the Cristobal shops by the United States Navy, was installed.

ELECTRICAL INSTALLATION AND REPAIR WORK

The principal activities of the electrical division are as follows: The operation and maintenance of the power system; the operation and maintenance of telephone, telegraph, electric clock, fire alarm, printing telegraph, and railway signal systems; the operation and maintenance of the street lighting system; and the installation and maintenance of such electrical equipment as is required by other divisions of the Panama Canal or other departments of the Government, and by such commercial and other vessels as may require

electrical work performed while transiting the Canal or calling at its terminal ports. Following is a comparison of the total expenditures of the electrical division for the past 2 fiscal years:

Expenditures	1937	1938
Maintenance and operation of power system	\$553,763	\$579,975
Construction and maintenance of electric work	510,328	482,443
Maintenance and operation of telephones	122,642	130,357
Maintenance and operation of railway signals	38,014	40,895
Total	1,224,752	1,233,670

Further details of the power system may be found on page 33 of this report, and of the telephone system on page 61.

There were 502 jobs completed in the marine electric shops for Government, commercial, and other vessels which called at the terminal ports or transited the Canal. In the armature shop at Balboa, 494 items of work were completed, the majority being for departments and divisions of the Panama Canal and Panama Railroad. The district wiremen handled a total of 19,475 trouble calls during the year. The handling of the foregoing work required the issuing of a total of 5,981 work orders with attendant reports, accounting, estimates, and miscellaneous correspondence, as compared with 5,431 work orders for the previous year.

Installation of electric ranges and water heaters in Panama Canal quarters was continued throughout the year, and at the end of the year there were 161 ranges of the two-burner type, 2 of the three-burner type, 2,052 of the four-burner type, and 17 of the six-burner type in use.

PURCHASES AND INSPECTIONS IN THE UNITED STATES

The purchase of general supplies in the United States for the use of the Panama Canal on the Isthmus is made by the Washington office except for certain purchases made by assistant purchasing agents at New York and San Francisco, and except that the Panama Canal, medical section, New York general depot, United States Army, Brooklyn, N. Y., purchases the principal medical and hospital supplies used on the Isthmus. In addition, the assistant purchasing agents at New York and San Francisco and the assistant freight-traffic manager at New Orleans of the United Fruit Co. have acted as receiving and forwarding agents for material and supplies delivered at and through their respective ports for transshipment to the Isthmus.

The preliminary inspection of materials in the United States covering purchases, the delivery of which is required on the Isthmus (which constitutes the large majority of purchases), and final inspection of materials delivered in the United States are made by the force

of inspectors in the field under the supervision of the inspecting engineer of the Panama Canal at Washington, assisted by the officers of the Corps of Engineers, United States Army; the Bureau of Standards; the Bureau of Mines; the Bureau of Chemistry, Department of Agriculture; the Medical Department, United States Army; the Bureau of Construction and Repair, and the Bureau of Engineering, Navy Department.

The volume of purchases made through the Washington office of the Panama Canal is indicated by the summary following:

	Fiscal year 1936	Fiscal year 1937	Fiscal year 1935
Number of purchase orders placed.....	8,267	19,004	8,198
Value of orders placed.....	\$4,311,429	\$4,912,582	\$4,281,979
Aggregate of purchases since 1904 made through Washington office.....	\$229,020,042	\$233,932,624	\$238,214,603
Number of disbursement vouchers prepared.....	11,528	11,911	12,128
Value of above vouchers.....	\$4,926,424	\$5,254,771	\$5,322,678
Number of collection vouchers prepared.....	321	318	308
Value of above vouchers.....	\$159,632	\$238,075	\$251,933
Cash discounts taken.....	\$35,978	\$42,076	\$49,119
Realized from sales of surplus material.....	\$23,632	\$123,925	\$90

¹ Largest number of orders placed during any fiscal year since 1904, when construction work on the Canal was begun.

STOREHOUSES AND SHIP CHANDLERY

In addition to its main function of requisitioning, storing, and issuing general supplies for the Canal and Railroad (exclusive of the merchandising operation of the commissary division) the Canal Zone storehouses handled ships' chandlery as well as sales of other supplies to the United States Army and United States Navy. The following statistics cover the more important operative features of the storehouse during the past 3 years:

	1936	1937	1938
Gross revenues—sales and issues.....	\$5,503,196	\$5,617,417	\$5,334,905
Cost of material, plus operating expenses.....	5,418,257	5,575,321	5,264,415
Net revenues.....	\$4,939	72,096	70,490
Inventory as of June 30.....	\$4,200,154	\$4,508,566	\$4,982,868
Scrap and obsolete stock on hand, June 30.....	\$31,504	\$24,826	\$19,156
Number of steamship sales.....	1,830	1,922	1,773
Steamship sales value.....	\$46,184	\$49,904	\$51,213
Scrap metal sold in local market..... tons.....	134	342	412
Scrap metal sold for export..... do.....	1,129	6,026	6,454

OBSOLETE AND UNSERVICEABLE PROPERTY AND EQUIPMENT

During the year disposition was made by sale, or by destruction where the items had no money value, of obsolete or unserviceable property and equipment which had an original value of \$557,493. Replacements were made as necessary.

FUEL OIL, DIESEL OIL, GASOLINE, AND KEROSENE

All deliveries of the products listed above to and from tanks for private companies, as well as for the Panama Canal and the United States Navy, are handled through pipe lines and pumping plants of the Panama Canal.

The following table summarizes the operation of the fuel oil handling plants for the past 3 years:

	Fiscal year 1936	Fiscal year 1937	Fiscal year 1938
Fuel and Diesel oil:			
Handled at Mount Hope (Atlantic side)	<i>Barrels</i> 4,678,830	<i>Barrels</i> 4,688,168	<i>Barrels</i> 3,754,037
Handled at Balboa (Pacific side)	3,359,712	4,344,893	3,733,629
Total barrels handled	10,068,542	9,033,061	7,487,666
Received by the Panama Canal	424,323	424,126	272,034
Used by the Panama Canal	424,672	223,625	214,021
Sold by the Panama Canal	6,945	147,891	37,424
Miscellaneous transfers on tank farm	39,884	17,094	15,257
Pumped for outside interests	9,172,718	8,220,325	6,948,930
Total barrels handled	10,068,542	9,033,061	7,487,666
Number of ships discharging or receiving fuel or Diesel oil:			
Panama Canal craft	74	90	141
All others	1,674	1,929	1,963
Total	1,748	2,019	2,044
Gasoline and kerosene:			
Bulk gasoline received	gallons 4,055,143	3,394,833	3,927,821
Bulk kerosene received	do 970,001	606,895	1,491,106
Financial results of operations:			
Total revenues	\$528,908	\$757,567	\$621,614
Total expenditures (including cost of sales)	649,221	627,716	593,305
Net revenues	179,687	129,851	28,309

BUILDING CONSTRUCTION AND MAINTENANCE

The principal projects of building construction work completed by the constructing quartermaster's division during the past year were as follows:

Cristobal.—No new construction.

Gatun.—Erection of gasoline service station.

Gamboa.—Erection for the gold population of a clubhouse, playshed, elementary school, and 32 buildings for family quarters; erection for the silver population of a clubhouse, theater, elementary school, and nine 12-family quarters; erection of a commissary with separate sections for the gold and silver employees; erection of a police substation, property storehouse, garage building, supply department office and shop, paint storehouse, and health department storehouse.

Pedro Miguel.—Erection of constructing quartermaster's shop building.

Ancon-Balboa.—Erection of new garage and shop buildings for housing the motor-transportation division; erection of magistrate's court building, Balboa post office, and rigger shop.

All others.—Erection of nurses' quarters at Corozal; erection of ward 18 at Palo Seco; erection of health department storehouse in Panama City.

In addition to the new construction, maintenance and repair work during the past year aggregated \$765,590, of which \$337,530 was expended on maintenance of quarters for gold employees and \$129,724 on maintenance of quarters for silver employees, the balance of \$298,336 having been expended on all other maintenance work performed by the constructing quartermaster's division.

The total volume of construction and maintenance work for the past 3 years is summarized as follows:

	1936	1937	1938
For Canal Divisions:			
Repair and maintenance work	\$594,457	\$512,537	\$665,604
Construction work	1,273,141	1,539,809	1,351,667
For the Panama Railroad Co.:			
Repair and maintenance work	163,715	46,537	41,931
Construction work	5,265	173,170	46,643
For other departments of the Government, employees, and others:			
Repair and maintenance work	50,649	74,015	58,055
Construction work			
Total	2,087,227	2,337,068	2,193,900
Total maintenance	801,958	633,089	765,590
Total construction	1,285,269	1,703,979	1,428,319
Total	2,087,227	2,337,068	2,193,900

QUARTERS FOR EMPLOYEES

Gold employees.—No changes were made in the general regulations governing the assignment and rental of quarters to American employees. The family quarters situation is slightly less acute than last year due to new quarters constructed at Gamboa and the removal to that point of 52 families from other districts. On June 30, 1938, there were 56 applications on file for original assignment to gold family quarters, a decrease of 43 from the previous year.

Silver employees.—The operation of silver quarters was continued on the same basis as in previous years. Nine 12-family houses were constructed at Gamboa, all of which are now occupied by employees and their families moved mainly from Paraíso. The demand for quarters from employees on the silver roll is still far in excess of the supply, there being 1,145 accepted applications on file on June 30, 1938. Over 50 percent of the silver employees continue to reside in the cities of Colon and Panama, where rental rates are considerably higher than charged by the Canal for Government quarters.

A number of the old frame quarters, both gold and silver, have been disposed of by sale to highest bidders, and others have been condemned because of excessive maintenance costs due to deterioration. It is believed that the present scale of rental charges on both gold and silver quarters will be sufficient to cover depreciation as well

as all other costs of maintenance and operation once the old frame buildings are replaced by the newer types.

REPLACEMENT OF QUARTERS FOR AMERICAN EMPLOYEES

About 10 years ago cost records indicated that the expense of maintaining the oldest frame quarters for American employees had reached the point where replacement was the most economical procedure. A survey showed some of these old quarters were built by the French Canal Co. and by the Panama Railroad Co. before the United States acquired the Canal Zone in 1904. There were also in use a large number of construction camp type of frame houses built during the first years of American operations and large numbers of similar houses built prior to 1915. Some of these were reerected houses which had been moved from towns that were abandoned upon completion of construction work. It was realized that their replacement would require an extensive construction program over a period of years. The matter was placed before Congress and the first appropriation for replacement of quarters for American employees was made for the fiscal year ended June 30, 1927.

The first types of quarters designed and built for the permanent force were of concrete. On account of the large first cost of concrete buildings, designs were resorted to of concrete column and first-floor beams with wood frame structure above. After experience in the construction and maintenance of various types of houses, and after giving consideration to original cost, upkeep, etc., the wooden structures supported on concrete beams have been adopted as standard, and are preferred by a majority of the employees.

The quarters constructed in Gamboa during the fiscal year 1938 comprised 52 family apartments. A total of 22 family apartments are authorized for Gatun, and 29 for Ancon-Balboa during the fiscal year 1939. There remain to be provided in the replacement program during the future years, 384 family apartments and 533 bachelors' apartments or rooms.

The following table shows the number of apartments for American employees' quarters which were to be replaced as of June 30, 1926, the replacements by years up through 1939, and the balance remaining to be replaced after the fiscal year 1939:

Number of apartments for American employees' quarters

It includes 9 additional bachelor quarters required at Craton on account of increase in lock force because of 40-hour week.

2 The quarters built at Gramacho will replace quarters at Pedro Miguel and in other districts.

3 Reduced from 831 to 760 due to less demand for bachelor quarters.

MOTOR TRANSPORTATION

The transportation division is charged with the operation and maintenance of all motor and animal transportation furnished to the departments and divisions of the Panama Canal and Panama Railroad Co. This division is required to operate on a self-sustaining basis, primarily to supply transportation at a minimum cost to the Panama Canal and Panama Railroad Co. Revenues during the past year totaled \$393,743 and expenses \$372,243, which left a net revenue of \$21,500. A considerable amount of heavy hauling in connection with various building and highway construction projects was accomplished during the year.

An entirely new plant was erected during the year covering an area of 171,108 square feet on Gaillard Highway, Ancon. The main building is of composite and steel construction and houses 12 separate units which compose the main plant. The old plant at Ancon was abandoned April 1, 1938, and the buildings were disposed of by sale to the highest bidders. Considerable new equipment was purchased and installed. During the year 84 cars and trucks and 2 trailers were purchased, and 76 cars and other pieces of equipment were retired. At the close of the fiscal year 356 cars and trucks, 3 trailers, and 4 motorcycles were on hand.

PANAMA CANAL PRESS

The operations of the Panama Canal Press were continued under the same policy as heretofore. The printing plant carries stocks of papers, etc., and manufactures such necessary stationery, forms, etc., as are required on the Isthmus in connection with the operation of the Panama Canal and the Panama Railroad. It is also charged with the printing of the official publication, *The Panama Canal Record*. The following statistics outline the operations of this plant during the past 2 years:

	1937	1938
Gross revenues	\$220,166	\$228,718
Total output expense (includes supplies not processed in the printing plant)	207,026	220,598
Net revenue	13,110	8,120
Manufactured output (included in total output above)	160,548	162,673
Inventory on hand, June 30	73,280	80,498

REVENUES DERIVED FROM THE RENTAL OF LANDS IN THE CANAL ZONE

Rentals on building sites and oil-tank sites in the Canal Zone totaled \$45,814 for the year, as compared with revenues of \$46,349 for the fiscal year 1937. Rentals of agricultural lands in the Canal Zone totaled \$12,072, as compared with \$13,062 for the preceding year.

At the close of the fiscal year 1,132 licenses were in effect, covering 2,244 hectares of agricultural land within the Canal Zone. This is a reduction in the number of licenses under the previous fiscal year of 55, and a reduction in the area held under licenses of 145 hectares. This reduction was largely the result of the policy adopted in May 1935, providing that as a health measure no more licenses for agricultural lands would be issued and that no sales or transfers of holdings under licenses would be permitted.

BUSINESS OPERATIONS UNDER THE PANAMA RAILROAD CO.

The Panama Railroad Co. was incorporated in 1849 under the laws of the State of New York for the purpose of building and operating a railroad across the Isthmus. In 1904, before actual construction work on the Panama Canal was started, the United States Government secured control of the capital stock of the Panama Railroad Co., which it now owns or controls completely, and has operated the company since that date through a board of directors.

By Executive order of May 9, 1904, the President of the United States directed that the general policy of the railroad be controlled by the United States and that the road be made an adjunct to the Panama Canal, at the same time carrying on its operations as a common carrier. Since that time the corporation has established and operates various business activities upon the Isthmus incidental to the construction, operation, and maintenance of the Canal. Thus the United States Government is conducting the business activities relating to the Canal enterprise under two distinct organizations: first, the Panama Canal, which is a direct branch of the Government; and second, the Panama Railroad Co., which is a Government-owned corporation. As the activities of the railroad company are covered in detail in its annual report, only the major features of operation as they relate to the Canal administration are covered in this section.

In addition to the operation of the trans-Isthmian railroad, the enterprises of the Panama Railroad Co. include commissaries, which are retail general stores selling primarily to Government employees; cargo handling activities at the harbor terminals; hotels; coaling plants; a steamship line; telephone system; and certain real estate operations in the Republic of Panama.

The operations of the railroad proper, harbor terminals, coaling plants, stables, and baggage transfer were continued throughout the year under the direction of the general manager of the railroad; the telephone system under the electrical engineer; and the commissaries, Hotels Washington and Tivoli, and subsidiary activities under the chief quartermaster. On February 1, 1938, there was established a real estate section of the Panama Railroad Co.; since that date renting

of land and buildings has been handled by the chief, real estate section, which position has replaced that of the land agent.

Business operations on the Isthmus, carried on by the Panama Railroad Co., yielded a profit of \$1,183,453 for the fiscal year 1938, as compared with \$1,358,596 for the previous fiscal year, a decrease of \$175,143.

THE RAILROAD LINE

This railroad line operates between Colon at the Atlantic terminus and Panama City at the Pacific terminus. In addition to these cities, it serves all activities of the Panama Canal. The gross revenue during the fiscal year 1938 from the operations of the railroad proper (not including subsidiary business activities) amounted to \$1,600,748.

Tonnage of revenue freight amounted to 280,205 tons, as compared with 311,007 tons during 1937, a decrease of 30,802 tons.

Statistics covering the various features of railroad operations during the past 3 years are presented in the following table:

	1936	1937	1938
Average miles operated, Colon to Panama-----	47.61	47.61	47.61
Gross operating revenue-----	\$1,456,165	\$1,609,744	\$1,600,748
Number of passengers carried:			
First class-----	161,813	161,443	159,574
Second class-----	177,631	194,338	199,323
Total-----	339,444	355,781	358,897
Revenue per passenger-train-mile-----	\$3.64	\$3.78	\$3.42
Revenue per freight-train-mile-----	\$11.09	\$11.88	\$12.63
Freight, passenger, and switch locomotive mileage-----	293,942	316,031	326,118
Work-train mileage-----	4,803	15,605	13,916
Passenger-train mileage-----	122,904	133,975	142,257
Freight-train mileage-----	72,442	73,477	68,524

RECEIVING AND FORWARDING AGENCY

This division handles the dock and harbor activities of the Panama Railroad Co. at the two terminals of the Canal. The following statistics summarize operations for the past 3 years:

	1936	1937	1938
Total revenue-----	\$1,662,461	\$1,812,959	\$1,898,086
Cargo handled and transferred-----	<i>Tons</i> 1,373,179	<i>Tons</i> 1,446,818	<i>Tons</i> 1,530,287
Cargo stevedored-----	483,381	581,533	617,137
Total-----	1,856,560	2,028,351	2,147,424
Cargo ships handled-----	4,584	4,589	4,601
Banana schooners handled-----	1,306	1,203	1,326
Agency service furnished vessels-----	161	164	106

COALING PLANTS

Operations of the coaling plants in the fiscal year 1938 showed a substantial improvement as compared to operations during the past 6 years. Sales increased by 31,983 tons, or 44 percent, as compared to the previous year, and were greater than any year since 1931. The following statistics summarize the operations of the coaling plants at Cristobal and Balboa for the past 3 fiscal years:

	1936	1937	1938
Gross revenues-----	\$333,499	\$552,140	\$767,126
Coal sold-----	Tons 41,813	Tons 71,861	Tons 103,844
Coal purchased-----	54,925	59,944	124,884

TELEPHONES AND TELEGRAPHS

The gross revenue from the operation of telephones, electric clocks, and electric printing telegraph machines amounted to \$239,433.

During the year 1,528 telephones were reconnected or installed, and 1,494 were removed or discontinued, resulting in a net increase of 34 telephones for the year. At the end of the fiscal year there were 3,049 telephones, 52 electric clocks, and 24 automatic printing telegraph typewriters in service. Local and long distance telephone calls handled through the automatic exchanges averaged 55,024 per day this year, as compared with 52,608 calls per day last year. This results in a daily average of about 18 calls per telephone.

REAL ESTATE OPERATIONS

Real estate operations of the Panama Railroad Co. cover property owned by the company in the cities of Panama and Colon and buildings erected by the company in the Canal Zone. There were in effect at the close of the fiscal year 1938 a total of 1,542 leases and 17 licenses covering the use of Panama Railroad properties in the cities of Panama and Colon. During the past year 900 square meters of land in the city of Panama, not used for business purposes, were sold.

As previously stated, a new section, the real estate section, was established on February 1, 1938, to handle all real estate operations of the Panama Railroad Co. on the Isthmus, including any real estate operations carried on for the Panama Canal. This section has operated since that date under an official designated as the chief, real estate section, which position has replaced the former one of land agent.

Pursuant to authority of a public resolution of Congress approved July 10, 1937, the Secretary of War appointed a board of 3 appraisers to examine and determine the value of the lands on the Island of

Manzanillo owned by the company. The board began its task at a meeting held in Ancon, Canal Zone, on February 3, 1938, and submitted its final report to the president of the company on April 21, 1938.

COMMISSARY DIVISION

The primary function of the commissary division of the Panama Railroad is to maintain adequate stocks of food, clothing, and household supplies to meet the needs of Government personnel and of various United States Government departments on the Isthmus. In carrying out this function the division operates retail stores in each of the Canal Zone villages, and also central wholesale warehouses and cold-storage plants. Sales are restricted to agencies and personnel of the United States Government, except that sales of ice, cold storage, food, and other essentials are made to commercial steamships transiting the Canal or calling at its terminal ports.

Net sales for the year totaled \$8,518,242, as compared with \$8,113,111 for the previous fiscal year. At the close of the year the value of merchandise on hand was \$1,079,298, as compared with \$1,131,903 at the close of the fiscal year 1937. The ratio of sales to inventory indicates a theoretical stock turn-over every $2\frac{1}{5}$ months, or approximately five and one-half times a year. The distribution of sales for the past year as compared with the 2 preceding years was as follows:

	1936	1937	1938
U. S. Government (Army and Navy).....	\$942,044	\$1,053,630	\$1,286,237
The Panama Canal.....	737,113	795,227	823,936
The Panama Railroad.....	259,287	307,811	273,139
Individuals and companies.....	313,501	265,590	270,259
Commercial ships.....	304,548	354,342	327,944
Employees.....	5,374,016	5,827,402	6,054,100
Gross sales.....	7,930,509	8,604,002	9,035,615
Less discounts, credits, etc.....	353,388	490,890	517,373
Net sales.....	7,577,121	8,113,112	8,518,242

PURCHASES

Purchases during the year aggregated \$6,150,750, an increase of \$200,738 as compared with the previous year. The following tabulation shows the value of the various classes of materials purchased, as compared with the 2 preceding years:

	1936	1937	1938
Groceries.....	\$1,603,082	\$1,780,970	\$1,861,179
Candy and tobacco.....	340,615	330,148	328,061
Housewares.....	363,354	347,647	340,051
Dry goods.....	713,353	776,306	829,161
Shoes.....	209,211	203,551	212,065
Cold storage.....	1,030,777	1,020,563	1,175,048
Raw material.....	458,402	471,335	418,734
Cattle and hogs.....	180,410	189,174	201,178
Milk and cream.....	160,866	185,853	224,883
Dairy products.....	569,784	644,466	560,390
Total.....	5,609,854	5,950,013	6,150,750

MANUFACTURING AND OTHER PLANTS

The output of the various plants of the commissary division during the past year had a total value of \$1,815,227, as compared with \$1,690,882 for the preceding year. Statistics covering the operation of these plants during the past 3 fiscal years are presented in the following table:

		1936	1937	1938
Laundry:				
Pieces handled.....		4,416,307	5,575,016	6,578,616
Value of output.....		\$187,671	\$211,620	\$230,204
Bakery:				
Bread baked.....loaves		4,307,400	4,370,515	4,459,550
Value of output.....		\$281,547	\$310,389	\$317,402
Coffee roasting plant:				
Coffee roasted for sale.....pounds		228,076	253,849	268,451
Value of put/put.....		\$60,406	\$61,540	\$65,455
Ice manufacturing plant:				
Ice manufactured.....tons		22,737	17,894	22,660
Value of output.....		\$160,164	\$130,791	\$125,584
Ice cream and milk bottling plant:				
Ice cream manufactured.....gallons		124,130	132,043	133,225
Milk bottled.....quarts		1,053,524	1,254,230	1,487,857
Cream bottled.....do		25,201	23,437	33,284
Value of output.....		\$318,417	\$353,935	\$406,091
Sausage factory and pickling department: Value of output.....		\$73,530	\$93,288	\$103,301
Industrial laboratory: Value of output.....		\$269,470	\$284,731	\$315,473
Abattoir:				
Cattle killed.....head		4,008	4,266	4,313
Value of output.....		\$253,235	\$244,288	\$245,717
Value of total output.....		\$1,604,441	\$1,690,882	\$1,815,227

HOTELS

The Hotels Tivoli and Washington were operated by the Panama Railroad Co. without any change of policy. These hotels are an essential adjunct to the Canal for the purpose of providing suitable accommodations to people having business with the Canal, foreign visitors, American tourists, visiting Government officials, and others.

The gross revenue from hotels was \$329,584, as compared with \$360,830 in 1937, and the number of guest-days was 45,402, as compared with 51,922 in 1937.

MINDI DAIRY

The operation of the Mindi dairy continued as in previous years. Milk production for the year amounted to a total of 370,721 gallons, as compared to 316,074 gallons in the preceding fiscal year, an increase of 54,647 gallons. Fresh milk was supplied to the Army and Navy during the year in addition to the regular Canal Zone trade. The old milk cooling plant was replaced by a larger and more modern plant. Buildings and pastures were maintained in good condition by the dairy operating force.

PANAMA RAILROAD STEAMSHIP LINE

The gross operating revenue for the steamship line for the fiscal year ended June 30, 1938, amounted to \$1,546,118.06, and the gross operating expenses amounted to \$1,714,453.13, resulting in a net deficit from operations of \$168,335.07. The operating deficit compared with the net loss for the fiscal year ended June 30, 1937, of \$212,206.90, shows an increase in the net revenue of \$43,871.83.

For the year ended June 30, 1938, the tonnage carried by the steamship line amounted to 188,014 tons, as compared with 178,999 tons in the previous year.

The steamship line carried freight and passengers for account of the Panama Canal and other departments of the Government of the United States at material reductions from tariff rates, which amounted to the important sum of \$535,710.11. Had regular tariff rates been received by the steamship line for such freight and passenger services performed for the Panama Canal and other Government departments, its income would have been increased by \$535,710.11, and its operations for the year would have resulted in a profit of \$367,375.04.

SECTION III

ADMINISTRATION

DEPARTMENTS

The organization of the Panama Canal on the Isthmus embraces five principal departments—namely, operation and maintenance, supply, accounting, executive, and health. In addition to this, an office of the Panama Canal is maintained in Washington, D. C. The Panama Railroad Co., a Government-owned corporation conducting business enterprises on the Isthmus, is a distinct unit, yet it is closely affiliated with the Canal organization.

OPERATION AND MAINTENANCE

The department of operation and maintenance embraces functions related to the actual use of the Canal as a waterway, including the dredged channel, locks, dams, and aids to navigation, accessory activities such as shops and drydocks, vessel inspection, electrical and water supply, sewer systems, roads and streets, hydrographic observations, surveys and estimates, and miscellaneous construction other than the erection of buildings.

SUPPLY

The supply department is charged with the accumulation, storage, and distribution of materials and supplies for the Panama Canal and Railroad; the maintenance and construction of buildings; the assignment of living quarters to employees and care of grounds; the operation of storehouses, fuel-oil plants, an experiment garden, and a printing plant, and the supplying of motor transportation facilities to the various departments and divisions of the Canal and Railroad organizations.

ACCOUNTING

The accounting department is responsible for the correct recording of financial transactions of the Canal and Railroad; the administrative auditing of vouchers covering the receipt and disbursement of funds preliminary to the final audit by the General Accounting Office; cost keeping of the Canal and Railroad; the checking of timekeeping; the preparation of estimates for appropriations and the allotment of appropriations to the various departments and divisions; and the examination of claims.

EXECUTIVE

The executive department embraces the general office business of the Governor and all administrative activities invested by Executive order within the authority of the executive secretary. Under this department come the administration of police and fire protection, postal service, customs, shipping-commissioner work, estates, schools, general correspondence, and records for the organization of the Canal and Panama Railroad, personnel records and administration, wage adjustments, statistics of navigation, information and publicity, relations with Panama, and the operation of clubhouses, restaurants, moving-picture theaters, playgrounds, etc.

HEALTH

The health department has jurisdiction over all matters pertaining to sanitation and public health within the Canal Zone and the cities of Panama and Colon, the operation of hospitals and dispensaries, and the enforcement of quarantine regulations.

PANAMA RAILROAD CO.

The operations of the Panama Railroad Co. on the Isthmus are generally related closely to the work of the Canal. As the Governor of the Panama Canal is president of the Panama Railroad Co., the heads of departments of both the Canal and Railroad organizations report to him. The general administration of the composite organization is centered in the executive office, and the accounting work in the accounting department; the Panama Railroad and the business divisions of the Canal organization are billed for their proper share of the general overhead work.

CHANGES IN ADMINISTRATIVE PERSONNEL

Appointments in official positions during the fiscal year 1938 were as follows:

Mr. Edward S. Randolph was appointed designing engineer, special engineering section, on July 1, 1937, by transfer from the office-engineer section. Mr. Randolph is in charge of the special engineering section and reports to the engineer of maintenance.

The position of administrative assistant to the Governor was established on July 22, 1937, and Mr. E. A. Erbe was appointed to fill the office on that date, the position of assistant executive secretary, which he formerly held, being abolished.

Lt. Col. Frederick H. Petters, United States Army, was appointed superintendent of Colon Hospital on October 2, 1937, vice Lt. Col.

James A. Bethea, United States Army, relieved from duty with the Panama Canal.

Lt. Col. Cleve C. Odom, United States Army, was appointed superintendent of Corozal Hospital on October 2, 1937, vice Lt. Col. John B. Anderson, United States Army, relieved from duty with the Panama Canal.

Capt. Thomas A. Symington, United States Navy, was appointed as assistant to the Governor on October 2, 1937, and on October 3, 1937, was appointed marine superintendent, vice Capt. Walter F. Jacobs, United States Navy, relieved from duty with the Panama Canal.

Mr. Alfred F. Morris was appointed chief of the real estate section, Panama Railroad Co., on February 1, 1938. The establishment of this section, effective February 1, 1938, abolished the title of land agent.

Commander George T. Howard, United States Navy, was appointed assistant to the marine superintendent on May 25, 1938, and on May 28, 1938, was appointed captain of the port (Balboa), vice Commander Bertram J. Rodgers, United States Navy, relieved from duty with the Panama Canal.

EMPLOYEES

The force employed by the Panama Canal and the Panama Railroad Co. comprises two classes designated locally for convenience as "gold" and "silver" employees. The terms "gold employee" and "silver employee" originated with the practice adopted during the early construction period of the Canal of paying common laborers and other unskilled employees recruited in the Tropics in Panamanian silver coin, while those recruited from the States, such as skilled craftsmen and those occupying executive, professional, civil service, and similar positions, were paid in gold coin.

All employees are now paid in United States currency, but it is convenient to retain the original terms used to designate the two categories of employees. The terms "gold" and "silver" are also applied to quarters, commissaries, clubhouses, and other facilities.

The gold employees (those carried on the gold pay roll) are, with a few exceptions, American citizens, and embrace those employed in the skilled trades and in the executive, supervisory, professional, sub-professional, clerical, and other positions where education, training, and special qualifications are required.

The force of silver employees is comprised almost entirely of natives of the Tropics. A considerable number of these are Panamanians and the majority of the others are workers who were brought to the Isthmus from various islands in the West Indies during the

early construction period of the Canal, or are children of these former workers. The force of silver employees embraces the common laborers, helpers, and semiskilled workers who have acquired some manual dexterity but are not first-class craftsmen in their respective trades.

It will thus be seen that our employees are divided into two general classes, one of which comprises United States citizens and the other principally native tropical labor. These two classes are carried on separate pay rolls and the conditions of employment applicable to each are radically different. The division of labor between the two classes of employees is a matter of long custom in tropical countries and our practice conforms therewith.

PERSONNEL ADMINISTRATION

Special attention was directed during the year toward the development of more complete information regarding the personnel resources of the gold roll organization to facilitate the transfer and advancement of qualified employees and to provide for emergencies. As a means of obtaining this information, a personnel inventory form was prepared and distributed to all gold roll employees, except department and division heads, with instructions to furnish information concerning their training and experience, their desire for transfer, occupations in which they had specialized or possessed special skill, and related qualifications. The completed forms are being analyzed and cross-indexed so that full information regarding employees may be available readily in time of emergency, for purposes of transfer, and for maximum utilization of the occupational and other skills of gold roll employees.

An in-service training program was conducted during the past year for the group of 21 student engineers who had been brought into the Panama Canal service in the past 2 years. Work begun in the 2 previous years was continued during the past year in connection with improving different phases of the employment procedure and with the rating system for gold roll employees.

GOLD EMPLOYEES

The distribution of the gold personnel on June 1, 1938, and June 2, 1937, is shown in the following tabulation:

	June 2, 1937	June 1, 1938	Increase	Decrease
THE PANAMA CANAL				
Accounting department.....	170	174	4	
Dredging division.....	189	181	-8	5
Assistant engineer of maintenance:				
Office engineer.....	73	62	-11	
Surveys-meteorology.....	23	24	1	
Electrical division.....	174	176	2	
Locks division.....	339	283	-56	
Municipal division.....	113	105	-8	
Executive department:				
Executive offices.....	146	148	2	
Collector.....	15	15		
Paymaster.....	12	12		
Clubs and playgrounds.....	59	63	4	
Bureau of posts.....	67	73	6	
Civil affairs and customs.....	16	17	1	
Fire protection.....	47	48	1	
Police and prisons.....	164	167	3	
Magistrates courts.....	4	5	1	
Schools.....	140	147	7	
Fortifications division.....	3	3		
Health department.....	306	311	5	
Marine division.....	190	190		
Mechanical division.....	464	458	-6	
Supply department:				
Offices, chief quartermaster.....	10	10		
Constructing quartermaster.....	77	84	7	
District quartermasters.....	24	26	2	
Farm bureau.....	3	5	2	
Fuel oil plants.....	38	36	-2	
Storehouses.....	49	50	1	
Motorcar repair shop.....	27	28	1	
Motor transportation.....	32	29	-3	
Panama Canal Press.....	10	11	1	
Total, the Panama Canal.....	2,984	2,944	-51	91
PANAMA RAILROAD CO.				
General manager:				
Offices.....	39	41	2	
Railroad transportation.....	66	66		
Receiving and forwarding agency.....	92	99	7	
Supply department:				
Commissary division.....	220	218	-2	
Hotels.....	14	15	1	
Dairy farm.....	3	3		
Total, Panama Railroad Co.....	434	442	10	2
Total force.....	3,418	3,386	-32	93

Increases may be noted in 21 of the 36 units listed in the above table and decreases in 8 units. The apparent decrease of 56 in the locks division is due to the fact that certain temporary employees, who had been taken on only for the biennial overhaul of the locks, were separated from the service subsequent to June 1, 1937. The decrease in the section of the office engineer is mainly due to the reductions among temporary employees who were taken on to handle the extra work of completing designs and estimates 1 year ahead of construction.

RECRUITING AND TURN-OVER OF FORCE, GOLD EMPLOYEES

The following table shows additions to the gold force and separations from it in the fiscal year from July 1, 1937, to June 30, 1938. Employments are classified as made in the United States or on the Isthmus, and separations are classified by cause:

Gold force	Operation and maintenance	Executive	Supply	Health	Accounting	Panama Railroad Co.	Total
Employed or reemployed in the United States	26	27	1	38		10	102
Employed or reemployed on the Isthmus	90	161	38	35	9	32	265
Total additions	116	88	39	73	9	42	367
Resigned	52	43	8	39	6	17	165
Retired:							
Age	19	1	2	2	3	2	29
Disability	9	7	2		1	2	21
Voluntary	12	6	2	2		6	28
Died	4	3	1	1	1	1	11
Discharged:							
Reduction of force	13	1	2	1	1		18
Expiration of temporary employment	28	10	13	23		2	76
Cause	4	3	1			2	10
Physical disability	1						1
Request of superior officer	1						1
Completion of apprenticeship	1						1
Without prejudice (involuntary) (account of marriage)		4		1			5
Ill health	2	1		2			2
Transferred to silver roll							3
Total separations	146	79	31	71	12	32	371

¹ There were 37 substitute teachers and 4 student assistants employed on a part-time basis on gold roll during the fiscal year 1938 whose employments were not shown in the above table.

The Panama Canal:	Panama Railroad Co.:
Additions	325
Separations	339
Net separations	14
	Net additions

Based on an average aggregate gold force of 3,393 for the year, the 371 separations shown above give a turn-over of 10.93 percent from all causes, as compared with a turn-over rate of 12.04 percent for the fiscal year 1937, which was based upon an average of 3,364 employees. The turn-over rate when discharges by reason of expiration of temporary employment are excluded is 8.7 percent for the fiscal year 1938 as compared with 7.8 percent for the fiscal year 1937.

The Washington office of the Panama Canal tendered employment, on requisitions above the grade of laborer, to 191 persons, as against 470 the previous year. One hundred and six persons accepted tenders and were appointed, covering 31 classes of positions. This was a decrease from the previous fiscal year when 263 appointments were made. The decrease was due mainly to the fact that there was no lock overhaul as was the case during the previous year. Two thousand eight hundred and eighty-three persons (2,635 from New York, 72 from New Orleans, 17 from other Atlantic coast ports, 153 from

Pacific coast ports, and 6 via air transport service), including new appointees, employees returning from leaves of absence and members of their families, were provided transportation from the United States to the Isthmus. This is a decrease of 102 from the previous year. One of the reasons for the decrease is that a number of employees arranged their own transportation via commercial line steamers, while others held return transportation for which they had already arranged prior to sailing from the Isthmus for the United States.

APPRENTICE-LEARNER PROGRAM

The Panama Canal and Panama Railroad Co. continued during the year the policy of training local young men and women for skilled craft and clerical positions as a means of providing suitable replacements for future retirements, resignations, and other types of termination of service among gold roll employees. In accordance with this policy 47 young trainees were appointed, from June 1937 to July 1938, to various apprenticeship and learnership positions. Of these, 11 were clerical learners who are in training for classified civil-service positions under a plan which has the approval of the Civil Service Commission. In June 1938, additional non-civil-service examinations were held locally in connection with the proposed employment of 15 additional apprentices and 8 additional learners. Seventy-five applicants competed in the written and performance tests, and registers of those attaining passing grades were submitted to department heads for selections for appointment in these training positions.

Some study has been made concerning the establishment of a training program for the most highly qualified young silver applicants, for the purpose of increasing the occupational skill and employability of the silver labor supply through junior helper employment at a nominal rate of pay during the period of training.

WAGE ADJUSTMENTS

The Panama Canal Act provides that salaries or compensation for Panama Canal employees fixed thereunder by the President or by his authority "shall in no instance exceed by more than 25 percent the salary or compensation paid for the same or similar service to persons employed by the Government in continental United States." It has been the policy generally to pay to United States citizens employed on the gold roll the full 25 percent differential above pay for similar work in Government employment in the United States, within the limit of appropriations and subject to the preservation of coordination within the organization. This is justified by the special disadvantages inherent in the climatic, economic, and social conditions prevailing on the Isthmus.

The prevailing allocation of employees included under the classification coincides for the most part with the initial allocations made in 1928 and 1929 immediately following the passage of the Welch Act. As the duties and responsibilities of positions change from time to time, due to reorganization, changes of personnel, creation of new positions, etc., the classification committee met frequently throughout the year to consider and take appropriate action on recommendations for regradings as submitted by heads of departments and divisions.

The wage board, consisting of the assistant engineer of maintenance and a representative selected by an organization of employees and approved by the Governor, held one meeting during the year in connection with a request of the railroad locomotive engineers and conductors.

The salary board, composed of the heads of the nine major departments and divisions of the Panama Canal and Panama Railroad, held no meetings during the year.

The complaints board, established for the purpose of investigating and reporting on complaints of employees, held one meeting during the year in connection with an appeal from the discipline administered to two railroad locomotive engineers and two conductors.

SILVER EMPLOYEES

The number of employees on the silver roll by departments or divisions on the last force reports, June 1937 and June 1938, is shown in the following tabulation. This summary covers the specific days on which the force report is made, but it is believed to be fairly representative for most of the divisions. In some divisions the number of employees at work may change by several hundred within a short time, according to variations in the demand for hourly rated labor. The summary shows only those actually at work on June 1, 1938, and June 2, 1937:

	June 2, 1937	June 1, 1938	Increase	Decrease
THE PANAMA CANAL				
Accounting department.....	3	3	-----	-----
Dredging division.....	886	849	-----	37
Assistant engineer of maintenance:				
Office engineer.....	5	4	-----	1
Surveys-meteorology.....	50	69	19	-----
Electrical division.....	185	213	28	-----
Locks division.....	853	672	-----	181
Municipal division.....	866	1,058	192	-----
Executive department:				
Executive offices.....	36	40	4	-----
Paymaster.....	2	2	-----	-----
Clubs and playgrounds.....	239	260	21	-----
Bureau of posts.....	18	18	-----	-----
Civil affairs and customs.....	1	1	-----	-----
Police and prisons.....	45	46	1	-----
Magistrates courts.....	2	2	-----	-----
Schools.....	116	122	6	-----

	June 2, 1937	June 1, 1938	Increase	Decrease
THE PANAMA CANAL—continued				
Health department	868	850	—	18
Marine division	496	589	93	—
Mechanical division	892	938	46	—
Supply department:				
Constructing quartermaster	806	975	169	—
District quartermasters	368	353	—	15
Farm bureau	24	86	62	—
Fuel oil plants	52	53	1	—
Storehouses	269	289	20	—
Motorear repair shop	47	49	2	—
Motor transportation	137	121	—	16
Panama Canal Press	74	75	1	—
Total, the Panama Canal	7,310	7,737	665	268
PANAMA RAILROAD COMPANY				
General manager:				
Offices	386	279	—	107
Railroad transportation	113	105	—	8
Receiving and forwarding agency	888	831	—	54
Supply department:				
Commissary division	1,128	1,184	56	—
Hotels	192	169	—	23
Dairy farm	112	105	—	7
Total, Panama Railroad Co.	2,819	2,676	56	199
Total force	10,159	10,413	721	467

Increases may be noted in 16 and decreases in 11 of the 32 units employing silver personnel. The increase of 192 in the force of the municipal division is entirely temporary and arises from the fact that a great deal more work was being done on dock 15 early in June 1938 than at the same time a year earlier. The increase of 169 in the constructing quartermaster's force is due to the fact that that division is now handling all new construction work for the Canal, whereas a great deal of this work had been done on contract during the previous year. The decrease of 181 in the silver forces of the locks division is due to the fact that certain temporary employees who had been taken on for the overhaul of the Pacific locks in the previous dry season were still carried on the rolls on June 2, 1937. The decrease of 107 listed under the offices of the general manager of the Panama Railroad Co. was caused by the temporary cessation of the reballasting program in the last 3 months of the fiscal year 1938.

Silver roll employment is frequently for relatively short periods. The employments or reemployments during the fiscal year totaled 5,284; the terminations, 4,846.

WAGE ADJUSTMENTS, SILVER EMPLOYEES

Wages of employees on the silver roll bear no definite relationship to rates of corresponding classes of employees in the United States, due to the fact that these employees are for the most part natives of the Tropics and their wage scales are generally established at levels based on the prevailing wages for tropical labor in the Caribbean area.

The maximum rate of compensation authorized for native employees, under Executive orders, is \$80 per month, or \$0.40 per hour, with the exception that the rates may be exceeded in the case of not more than 112 such employees possessing special qualifications. The basic hourly rate of compensation for common labor is \$0.20 per hour and has remained at this level since 1922 with later provisos that \$0.21 and \$0.22 may be used as the entrance rate where justified. Small bonuses are payable in some instances to employees who are shifted temporarily from their regular duties to other duties which involve disagreeable, dirty, or hazardous working conditions not taken into consideration when the employee's regular rates of compensation were fixed.

The silver wage board, which is composed of the heads of the major departments and divisions and administrative heads of a few of the smaller organizations which employ a considerable force of native labor, reports on the rates of pay and other conditions of employment affecting silver employees. This board held no meetings during the year.

APPLICANTS FOUND ELIGIBLE FOR EMPLOYMENT

During the year 1,560 applicants for employment were interviewed and subjected to physical examination; many others showing less evidence of fitness were rejected without further examination. Of the 1,560 who passed through the eligibility procedure, 155 were rejected and 1,405 received cards attesting their eligibility. Of these, 845 obtained employment during the year and at the end of the year 560 had not obtained employment. The eligibility work of the past year brought the total number of those interviewed and examined under the procedure to 3,859 at the close of the year. Of this number, 3,353 were made eligible and 506 were disqualified because of physical disability or other causes. Of those made eligible, 2,169 had obtained employment and 1,184 remained unemployed at the end of the year.

REPATRIATIONS

Under an act approved May 7, 1934, an appropriation of \$150,000 was provided by Congress for the purpose of repatriating unemployed aliens who have rendered at least 3 years' service with the United States Government or the Panama Railroad Co., on the Isthmus, and members of families of such alien former employees, including expenses of transportation and the payment in cash of not to exceed \$100 to each such alien former employee for assistance in rehabilitation after repatriation. It has been the practice to allow cash payment of \$25 to a single employee, \$50 to one with a wife, and \$10 additional for each child, with minor variations in special circumstances, within the limits of the maximum of \$100.

During the fiscal year 1938, \$3,301 was expended for the repatriation and rehabilitation of 40 former employees accompanied by 30 members of their families, a total of 70 persons. There is reluctance on the part of these people to accept repatriation due usually to the long period that they have resided on the Isthmus and due to a belief that their children have somewhat greater opportunity for employment here than in the native land of their parents.

Including those handled in 1938, approximately 1,137 persons have been repatriated since the appropriation became available. These included 569 former employees and 568 members of employees' families. Of this fund, \$41,925 has been expended at an average expenditure (repatriation plus allowance) of \$36.87 per person repatriated and an average cost of \$73.68 per employee repatriated.

The Canal will continue to offer the opportunity of repatriation and a sum for rehabilitation in their home country to former employees with at least 3 years' service while the fund lasts. This may relieve slightly the unemployment situation on the Isthmus, but will have relatively little permanent effect under present conditions because of the relatively high birth rate among the tropical inhabitants.

CASH RELIEF FOR DISABLED EMPLOYEES

The President of the United States approved on July 8, 1937, the act of Congress entitled "An Act Authorizing Cash Relief for Certain Employees of The Panama Canal Not Coming Within the Provisions of the Canal Zone Retirement Act" (50 Stat. 478). This act provides that the Governor of the Panama Canal may pay cash relief to such employees of the Panama Canal not coming within the provisions of the Canal Zone Retirement Act as may become unfit for further useful service by reason of mental or physical disability resulting from age or disease; and also for cash relief to such former employees of the Panama Canal not coming within the provisions of the Canal Zone Retirement Act as had within 3 years prior to the date of enactment of the act been separated from the service because of unfitness for further useful service by reason of such disability. Such cash relief is not to exceed \$1 per month for each year of service of the employee so furnished relief, with a maximum of \$25 per month, nor to be granted to any employee having less than 10 years' service with the Panama Canal, including any service with the Panama Railroad Co. on the Isthmus of Panama.

During the past fiscal year a routine was established for carrying out the provisions of this act and was put into effect on March 29, 1938. Payments to the first former employee found eligible to receive the benefits of the act were begun, effective June 1, 1938.

By the end of the fiscal year payments had been approved for 37 additional employees or former employees. During the year 253 applications for disability relief were received. Of these, 59 were transmitted to the disability relief board for action (including the 38 which were approved during the year), 21 were found ineligible because of the date of termination, 7 were found ineligible because of the cause of termination, 7 of the applicants were found fit for further service and continued in the service, 3 applicants died before their cases were acted on, 2 were continued in Corozal Hospital, and 2 cases were suspended for the present. The remaining 152 applications were in various stages of development.

PANAMA RAILROAD SUPERANNUATED EMPLOYEES

Effective March 29, 1938, treatment of Panama Railroad employees found unfit for further useful service by reason of age or disease was thereafter to be the same as the treatment established under the circular for employees of the Panama Canal coming under the act of July 8, 1937. The Panama Railroad Co. had established in 1928 provisions for pension or disability relief pay for its superannuated alien employees. Since June 1, 1928, 22 such employees unable to give further useful service have been given lump sum payments ranging from \$25 to \$500, and 305 employees have been granted monthly payments ranging from \$5 to \$30. Nineteen such cases had been acted upon during the fiscal year 1938 prior to March 29, 1938. Since 1928, 102 individuals granted monthly payments have died, been transferred to Corozal Hospital, disappeared, or otherwise become separated from the roll, leaving 203 on the roll for monthly payments at the end of the fiscal year. The following table shows the number of those granted monthly and lump sum payments and the number still receiving monthly payments at the end of the year:

Fiscal year	Lump sum	Monthly payments	Total retired	Died or otherwise separated (year)										Still living	
				Prior	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	
Prior.....		2	2												
1928.....		1	1												1
1929.....															
1930.....	7	26	33			1	5	1		6		1	1		11
1931.....	2	13	15			3	2		2	1	2	4	3		5
1932.....	2	21	26					2	1	2	4	3			12
1933.....	3	67	70						1	7	4	4	6	4	41
1934.....	5	62	67							6	2	3	1	2	48
1935.....	2	30	32								2	4	2	2	20
1936.....	1	34	35									1	4	3	26
1937.....		27	27										1	4	22
1938.....		19	19										2	2	17
Total.....	22	305	327	2	1	8	5	2	21	12	16	17	18	203	

UNEMPLOYMENT

Unemployment is a major social problem on the Isthmus, as elsewhere. The growth in population among the families of both American and native employees is in excess of the recruitment needs of the Canal and Panama Railroad Co. With respect to the American population, the rate of graduation from high schools and the junior college is somewhat in excess of the total replacement needs in permanent positions each year and the replacements are in many cases in positions for which the local young people are unable to qualify. The development of the apprentice-learner program, together with increased attention to vocational training in the schools, is directed toward fitting young Americans for employment in skilled crafts and other positions requiring specialized training. The apprentice-learner program, or plan of instruction through employment plus a half-day's schooling each week, has limitations of expense and executive management, as organizations find it difficult at times to make economical or convenient use of the trainees in their work.

A similar excess supply of young people for employment on the silver roll exists among the native population. All recruitments for the silver roll are made locally and there has been no shortage of labor for even the higher grades of silver roll employment. There have been some shortages of qualified applicants for semiskilled work who are relatively young and occasional difficulties in securing individuals of high skill, such as cooks, but in general the supply of semiskilled employees has been equal to the demand. In the levels of lesser skill and of plain labor there is a great excess supply. Efforts of the Canal are directed, in the schools and in advice given to silver roll applicants, toward the development of skill on the part of young people so that they may have eligibility for employment in the kinds of work for which the demand is fairly high.

While efforts are made and will continue to be made to improve the situation with respect to unemployment, it is not possible for the Canal alone to attain a lasting solution. From a personnel standpoint the procedure for the Canal is to make employments regularly and consistently on a merit basis, using the individuals best fitted for service and to give steadily such opportunities as it can for applicants to fit themselves for employment.

EXPERIMENT GARDENS

The Canal Zone plant introduction gardens and experimental station were established in June 1923. The gardens, which include greenhouses, nurseries, and experimental plantings, embrace approximately 125 acres of land, and are devoted to the propagation and cultivation of a very wide variety of useful and ornamental plants from all parts

of the world, primarily for the purpose of determining their adaptability and value under local soil and climatic conditions for general propagation on the Isthmus. The work of the experimental garden is under the supervision and direction of the Governor of the Panama Canal; however, many of the activities are carried on in close cooperation with the United States Department of Agriculture, and the Canal Zone experimental gardens function much the same as would a tropical station of the Agriculture Department. The value of these gardens as a tropical laboratory for development of plants useful in industry of the United States has been definitely established.

In August 1937 a landscape unit was formed as a part of the permanent organization of the experiment gardens. This new unit has been created in response to a growing need that has become increasingly apparent during the past several years. After construction of the Panama Canal and the establishing of permanent town sites, considerable thought and effort were given to the development of attractive landscapes. Some of the resulting effects have become widely known, such as the royal palm planting on the Prado in Balboa and the living-tunnel effect of the Chinese banyan trees planted along Roosevelt Avenue. After these initial creations there followed a period during which there was no unified supervision of landscaping, and this work was largely carried on without relation to any preconceived plans or ideas. The special need for attention to the general problem of landscaping arose in connection with planting for the new town site of Gamboa.

The work of exchanging plants with other experimental stations, botanical gardens, and individuals in various parts of the world was continued. As a result a number of interesting and valuable plants, seeds, and nuts were received to be used for local experimentation. Particular stress is and has been given to the propagation of plants and trees valuable as a food source, such as bananas, pineapples, avocados, mangoes, oranges, etc. Experiments with plants and trees having or thought to have potential value in the commercial world are also being carefully carried on. A total of 38,734 fruit trees, ornamental shrubs, etc., were distributed during the year, the greater part of which were transplanted in the Canal Zone.

Special research has been made during the past few years on the growth of the teak tree, in an endeavor to better understand the correlation between plant growth and rainfall on the Isthmus. An interesting development has been made of the *Syzygium Cymosum* from plants received in 1931. A new species of this tree has developed, and it is expected that this will become one of the outstandingly beautiful trees on the Isthmus both for shade and for street planting.

During the year a toolhouse, a workshop, and a greenhouse were constructed to replace structures deteriorated to a degree where

maintenance was impracticable. Paths totaling 5,748 feet were constructed during the year by prison labor to permit visitors and buyers to better view the outlying plants and trees.

Originally the gardens were supported by rents from agricultural land leases. However, due to a policy of gradually eliminating such leases in the interest of sanitation and health, the income from that source very considerably decreased and a small appropriation has been made for the partial support of the gardens since the fiscal year 1934. Further decrease in revenues has now reached the point where an increase in this appropriation is urgently needed to avoid curtailment of activities.

CLUBHOUSES AND PLAYGROUNDS

During the construction of the Panama Canal, recreational and welfare activities for Canal employees were conducted by the Y. M. C. A. with the financial support of the United States Government. These activities when carried forward into the permanent organization were placed under the bureau of clubs and playgrounds. Eventually many diversified activities, such as kindergartens, physical education, motion pictures, restaurants, soda fountains, candy and cigar stands, etc., were assigned to the bureau. Due to the expansion in activities, some of which were of a business or commercial character, in January 1936, after a detailed study, the activities of the bureau were subdivided into two units, as follows:

(a) The clubhouse subdivision which operates restaurants, soda fountains, news stands, candy and cigar counters, moving-picture theaters, billiard and pool rooms, bowling alleys, and swimming pools, and in which the patronage is restricted to Government personnel and their families. This subdivision is self-supporting and no appropriations are required for the activities carried forward.

(b) The playgrounds subdivision, maintained with appropriated funds, which provides facilities for outdoor recreation and promotes and supervises such activities as physical education, playground activities, baseball, basketball, hand-ball, football, tennis, boxing, fencing, archery, athletic meets, pageants, etc.

CLUBHOUSE SUBDIVISION

As private industry is not permitted in the Canal Zone, the Government is under the obligation of operating restaurants, motion-picture theaters, and other activities for which there is a community demand. A considerable number of these activities is under the clubhouse subdivision of the bureau of clubs and playgrounds for the reason that their centralization under one roof greatly facilitates administration and tends toward a lowering of operating costs. The activities in this unit are on a business basis.

During the past year a new gold and a new silver clubhouse were constructed and equipped in the town of Gamboa, to be opened on July 1, 1938. This will result in a net increase of 1 gold clubhouse,

since operations of the silver clubhouse at Paraíso were suspended as of the close of business on June 30, 1938. Purchase of all the equipment such as kitchen and restaurant equipment, motion picture projectors, etc., for these two clubhouses was financed from funds which had been set aside from operations of the other clubhouses during the past several years.

The Cristobal gold clubhouse built and opened its motion picture hall during the past fiscal year. This clubhouse has now completed 1 full year in its new location (the building formerly occupied by a Canal Zone restaurant), with activities in all departments taking on new life. The old clubhouse building that stood for 30 years as a community center for the Atlantic side was finally abandoned on September 24, 1937, when the activities of the motion picture service were moved across the street into the new theater. For 9 months this building was used only for bowling, occasional card parties, and a community county fair, and in June 1938 arrangements were made to demolish the building and clear the premises.

Along with the operation of swimming pools the clubhouses furnish instruction in swimming and life saving to the local community. The swimming and diving ability developed by the Canal Zone children was the subject of a short film produced during the past year by a leading motion picture company from the States in cooperation with the clubhouses.

There were no important changes in the prices or in the general clubhouse managerial policies during the past fiscal year. Restaurant revenues increased by 8.5 percent, sales at the tobacco and merchandise counters increased by 6.5 percent, and motion picture revenues increased by 6.5 percent, all as compared with the preceding fiscal year. As the average aggregate working force of the Canal-Railroad organization was about the same, these figures indicate a slight increase in the general use of clubhouse facilities by the employees and their families.

Several of the buildings which are now used to house the facilities of this bureau are very old wooden structures that have already outlived their economical lives. Some of these originally had been erected in construction towns of the Canal Zone and toward the end of the construction period were moved and reerected on their present sites. It was recognized at the time that these facilities were in the nature of a more or less temporary arrangement, but they were satisfactory and their replacement was not advocated because of the more urgent needs of the Canal. Several of these old wooden buildings are now in a badly deteriorated condition and require heavy maintenance expenditures; accordingly, the time is approaching when these buildings will no longer be adequate and when it will be necessary to replace them with permanent structures.

SUBDIVISION OF PLAYGROUNDS

When the United States Government embarked upon the Canal project in 1904, it was necessary to bring many thousands of employees from the United States and from the West Indies to the Isthmus. In the absence of proper recreational facilities in the Canal Zone, or in the cities of Panama and Colon under Panamanian jurisdiction, the Government embarked upon the policy of providing wholesome amusement and recreational facilities in each of the Canal Zone villages, similar to those provided in the District of Columbia and by many communities in the States, and likewise corresponding with those provided by foreign corporations operating in the Tropics.

Climatic conditions on the Isthmus and the ever-present danger of contracting malaria, dysentery, and other tropical diseases, when recreation is sought outside of the sanitized areas adjacent to the Zone villages, make the matter of providing adequate recreational facilities to Government personnel and their families of considerably greater importance than in communities in the States. In the absence of such facilities many employees undoubtedly would seek diversion and entertainment in unhealthy and undesirable ways and places.

The appropriation for playground activities covers the salaries of physical directors and directresses, kindergarten teachers, and playground attendants, and also provides funds for the maintenance of playgrounds, playsheds, ball diamonds, tennis courts, running tracks, and similar facilities, and for the purchase of playground and physical education equipment. Some of the recreational activities are partially self-supporting, but they cannot be made wholly so without greatly curtailing their scope and thus lessening the benefits now being derived through their extensive use.

The physical instructors and other personnel employed in the playground unit, in cooperation with the division of schools, have charge of the physical education program for all grammar, high school, and junior college students in the Canal Zone schools; conduct kindergartens for children of Government employees; and furnish active leadership and guidance to such organizations as the Boy Scouts, Girl Scouts, Sea Scouts, etc.

The recreational facilities provided by the playground subdivision are used extensively, not only by the civilian employees and their families, but also by the United States defense forces stationed on the Isthmus. Practically all facilities are utilized to their capacity during visits of units of the United States Navy. The cost of these physical and recreational facilities is more than repaid in increased efficiency and morale of the organization and in the improved general welfare and health of the entire Canal Zone population. There is ample

justification for the continuation of reasonable expenditures, such as have been made in the past.

A great improvement was completed during the past fiscal year on the playground at Cristobal. Additional grading work was accomplished on the field, a fence was erected around the grounds, a running track was made, and numerous purchases of new athletic equipment were made. In connection with this, three new baseball diamonds were graded and laid out to enhance the playground facilities at Cristobal. At Farfan Beach, in addition to numerous improvements, such as grading, etc., a merry-go-round was installed and is now self-supporting. There has been quite an improvement in the kindergartens during the past year. Enrollment is now restricted to children 5 years of age, which has made possible a better kindergarten program.

LEGISLATION

Two bills were enacted by the Congress during the year, and several other bills of interest to the Canal-Railroad organization or its employees were still pending before the Congress at the close of the last session without favorable action having been taken.

The term of the judge of the United States District Court of the Canal Zone was extended from 4 to 8 years by the provisions of legislation enacted in March 1938. A bill increasing to \$160,000 the amount authorized to be spent for the erection of a suitable memorial to Maj. Gen. George W. Goethals within the Canal Zone was approved on May 23, 1938. However, no additional funds were appropriated for this project.

Among other bills affecting the Canal-Railroad or its employees which were considered by Congress during the last year without favorable action having been taken at the close of the last session were the following:

A bill to authorize the appointment to the United States Naval Academy of a midshipman to be selected from among the sons of civilians residing in the Canal Zone and the sons of civilian employees of the United States residing in the Republic of Panama. This bill passed the Senate on June 28, 1937, and although it was reported favorably in the House on May 24, 1938, final action was not taken.

Two bills were introduced to provide for special recognition of the services rendered by civilian officers and employees during the construction of the Panama Canal. One of these bills affected only those employees who rendered 3 or more years of service during the construction of the Canal and remained in the service. The other bill was designed primarily to recognize the services of those who served during the construction period for 3 or more years and who left the service.

The provisions of another bill sought to permit employees of the Panama Canal and Railroad to select one of several kinds of retirement annuities. This proposed legislation, if enacted, would have permitted an employee at his option to select a decreased joint and survivorship annuity payable to the employee during his lifetime and to his widow upon his death.

Another bill, if enacted, would have authorized the erection within the Canal Zone of a memorial auditorium to the builders of the Panama Canal and others whose distinguished service merited recognition by the Congress. This bill was passed by the Senate on June 7, 1938, but was not reached for consideration by the House.

Several bills were introduced in both Houses for the purpose of providing governmental aid to American vessels engaged in the inter-coastal trade of the United States. These bills were of varying forms, one providing that no tolls should be levied upon vessels engaged in such trade; others providing for subsidies of various kinds to vessels engaged in that trade. However, no legislation of this kind was enacted.

Other general legislation considered by the Congress during the last session was carefully reviewed and studied for the purpose of determining its effect on the Canal-Railroad, and appropriate recommendations were made from time to time when the circumstances indicated the necessity for such action.

CAPITAL ALLOTMENTS, FISCAL YEAR 1939

The appropriation for 1939 carried \$2,129,900 for improvements and betterments, and for replacement of worn-out or excessively deteriorated facilities, as follows:

Quarters for American employees-----	\$400, 000
Dredging division station, Gamboa-----	200, 000
Lumber shed, Cristobal-----	145, 000
12-inch water line, Miraflores to west ferry landing-----	100, 000
Investigations and plans for increasing capacity of Canal in accordance with act of May 1, 1936-----	75, 000
Madden Dam and Reservoir, grouting, etc-----	60, 000
Rebuilding Cardenas River bridge-----	60, 000
High-tension switching equipment, Pacific locks-----	45, 000
Utility building, Colon Hospital-----	40, 000
Ward building, Palo Seco-----	30, 000
Replacing steam plant, Gorgas Hospital-----	30, 000
Improvements at Cristobal playground-----	26, 000
Rock fill, quarantine area, Balboa-----	25, 000
Extending roads, Mount Hope and Corozal cemeteries-----	23, 000
Extension to paint manufacturing shop, Balboa-----	7, 000
Special items-----	863, 900
 Total-----	 2, 129, 900

Quarters for American employees.—A considerable portion of the existing dwellings for American employees and their families consists of frame structures built prior to 1914 in the early days of American occupation, many of which had been removed from construction camps to their present locations in the permanent townsites. All of these frame quarters held over from construction days have become so deteriorated that they are not only below reasonable standards of family shelter, but the excessive expense of the temporary patchwork repairs, necessary to keep them habitable, is an economic waste. The old quarters are therefore being replaced by a continuous building program over a period of years.

Gamboa development.—The sum of \$200,000 allotted in 1939 will complete the new dredging division station at Gamboa, which has been under construction since 1936. This station has been developed to replace the old dredging station at Paraiso which was in need of replacement and was badly located. In case of closure of Gaillard Cut by slides, the major portion of dredging equipment, if located at Paraiso, would have been cut off from the dumps in Gatun Lake; furthermore, the channel at Paraiso is comparatively narrow, and the mooring of equipment in that restricted area constituted a menace to transiting vessels.

Lumber shed, Cristobal.—The new lumber shed at Cristobal is to be constructed to afford proper storage for lumber requiring special protection, such as flooring, siding, kiln-dried ceiling, redwood, hardwood, etc. Previously, this material had been stored in the open.

Twelve-inch water line, Miraflores to west ferry landing.—This project consists of running a 12-inch cast-iron water main from the water system on the east side of the Canal at Miraflores to activities on the west side of the Canal opposite Balboa. The new line will replace the one running underneath the Canal at Balboa. The latter line has broken several times in the past 4 years, and at such times no water was available on the west side of the Canal except from local wells.

Investigation and plans for increasing the capacity of the Canal.—This project consists of investigating the means of increasing the capacity of the Panama Canal for future needs of interoceanic shipping and preparing designs and approximate estimates of the cost of such additional locks or other structures and facilities as are needed for the purpose, in accordance with act of Congress approved May 1, 1936.

Madden Dam Reservoir, grouting, etc.—The amount of \$60,000 allotted for this project in the fiscal year 1939 provides for tests and clay grouting of the ridges bounding the reservoir if and when the

need develops. All of this work is an integral part of the construction of the dam.

Rebuilding Cardenas River Bridge.—This bridge is located on Gaillard Highway just south of Fort Clayton. The new bridge is to replace the present bridge which is in poor condition and has a load limit of 20 tons.

High-tension switching equipment, Pacific locks.—This project covers the replacement of equipment in the two original service switch-bank rooms at Miraflores Locks, requiring the construction or enlargement of two underground rooms connecting with the operating tunnels.

Utility building, Colon Hospital.—This building is to be erected for storage of medical supplies and linen, a shop for minor repairs, and dressing rooms for colored employees on duty at the hospital. It is to be a one-story structure of concrete, 105 by 38 feet. At the present time most of the medical supplies are stored in a basement; during the rainy season the basement is damp and, while every care is taken to prevent loss by deterioration, a certain amount of waste is inevitable.

Ward building, Palo Seco.—This building, which is to house inmates of the leper colony at Palo Seco, is to replace old buildings which, in addition to being inadequate as to size, are nearly 30 years old and not worth repairing.

Replace steam plant, Gorgas Hospital.—This item comprises the replacement of the central water-heating plant. The present plant, its auxiliaries, piping, water heaters, and fuel oil tank were installed in 1918.

Improvement at Cristobal Playground.—This project comprises construction of playground facilities, including a playshed. The new building replaces one that was built 18 years ago out of second-hand material and which is not worth repairing. The new project will be used both as a school playground and as a playground for smaller children of the kindergarten age. It will also be used by adults in the late afternoon and evenings for games and recreation.

Rock fill, quarantine area, Balboa.—This project consists of quarrying 7,400 cubic yards of rock from Sosa Hill quarry and placing it on the waterfront, adjacent to the Balboa oil farm and near quarters in the section immediately south of the farm. The fill is deemed necessary due to the erosion which has taken place in these areas in recent years.

Extension of roads in Mount Hope and Corozal cemeteries.—These roads are necessary to reach the burial space within the areas allotted to the cemeteries. Each extension will consist of a 16-foot concrete road, forming a loop from the present roads. At Mount Hope the new road will give access to burial space that will accommodate

graves for an estimated 15 years, while at Corozal the road should give access to burial space for approximately 20 years.

Extension of paint manufacturing shop at Balboa.—This project consists of a one-story lean-to extension along a portion of one side of the paint shop at the Balboa shops, which paint shop is a two-story steel-frame building with concrete walls and corrugated asbestos cement roof. The extension is to be of cement walls, steel purlins, and corrugated asbestos roof to match the main building, the roofing material being on hand as accumulated left-over from previous projects. The extension is for the purpose of increasing the working space required by the needs of the plant.

GENERAL PROGRAM

During each of the past several years the Canal Administration has given considerable study to all phases of Canal activities with a view to developing and carrying forward a comprehensive building and construction program, with advance planning extending some 10 years in the future. These studies have been carried out in order that the more pressing needs of the Canal project in the way of replacements, betterments, and enlarged facilities will be provided for under a carefully considered plan.

Previous studies made in this connection were reviewed during the past year, and a detailed 10-year advance construction program has been compiled covering improvements and betterments and also replacements of worn-out, obsolete, or excessively deteriorated facilities, for which funded reserves are insufficient. This program, which covers all anticipated requirements of this nature except for increasing the capacity of the Canal, requires an annual appropriation of about \$2,000,000.

The value of adopting and adhering to a definitely planned program of replacements and betterments lies in the fact that it not only facilitates the submission of comprehensive data regarding future needs to the Bureau of the Budget, but also appreciable savings in the purchase of materials, recruiting and employment of personnel frequently result from coordinating the program for replacements and betterments with the regular activities of the Canal organization.

ADDITIONAL NEEDS

As stated above, lists have been prepared of needed additions and replacements over a period of years and approximate estimates have been made of the costs. Obtaining funds for this work is one of the most important problems of the Panama Canal. For the construction of the Canal and its many auxiliaries, temporary, inexpensive,

wooden structures were built to house the shops and other parts of the construction plant, the employees, and many of the public-utility and governmental functions, and many of these continued to be used in the interest of economy for housing the operating plant and personnel after construction was completed. Because of the destructive effects of the elements and of the insects in this locality, the economical life of such structures is relatively short. The plan is to replace these with structures of longer life, and at the same time increase their capacity where justified, as funds are obtained. The undertaking is so extensive that many of these old structures are being maintained at excessive cost, and this uneconomical procedure will continue and become progressively worse at an accelerated rate unless funds for the purpose can be made available for replacements when needed. The most economical method of effecting replacements would be to allocate a definite sum to be used for this purpose each year, as this would permit coordinating the replacement program with the regular activities of the Canal organization.

ENGINEERING AND ARCHITECTURAL DESIGN

The plan of completing designs and estimates 1 year ahead of probable construction, which was started in the fiscal year 1936, has been achieved insofar as it is practical to do so, and a reduction in the temporary force engaged for this purpose has begun.

Studies were made for design of an additional lock caisson for use at the entrances of existing locks during overhaul periods. Designs were started for replacement of crib fenders at Pedro Miguel and Miraflores Locks. Preliminary work was done in connection with the overhaul of the Atlantic locks to be performed in fiscal year 1939.

Designs, lists of material, specifications, and estimates were prepared for 50 important residential, public, and industrial buildings, and corresponding work was started or continued on 41 similar projects. Work on various minor structures and alterations to existing ones was also performed. General office engineering services were performed for the Canal and Railroad as required.

STAFF AGENCY—PLANS SECTION

The plans section continued, in collaboration with the responsible department heads, to make studies of the financial, physical, and operating features of the Canal-Railroad divisions. This resulted in major studies for the commissary division and the real estate section of the Railroad Company, for the executive and supply departments of the Canal, and three other studies of a general nature. Many miscellaneous studies were also carried on and reports made.

INCREASING THE CAPACITY OF THE PANAMA CANAL

The necessity for the eventual improvement of the Canal to increase its capacity to meet the demands of the expected growth in the sizes of both merchant and warships and to accommodate the expected growth in volume of traffic through the years has been recognized for a long time. In connection with the report of the Interoceanic Canal Board, authorized by Public Resolution No. 99, Seventieth Congress, approved March 2, 1929, comprehensive studies of a general nature were made, and their results published in House Document No. 139, Seventy-second Congress, first session, 1932.

These studies and the reports submitted indicated the probability that additional capacity might be needed in the Canal within the next two or three decades and suggested the wisdom of more thorough studies of the possibilities, to culminate in the preparation of designs and estimates of the costs of the work needed. Accordingly, Public Resolution No. 85, Seventy-fourth Congress, was enacted and approved May 1, 1936. It reads as follows:

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Governor of the Panama Canal is hereby authorized and directed to investigate the means of increasing the capacity of the Panama Canal for future needs of interoceanic shipping, and to prepare designs and approximate estimates of cost of such additional locks or other structures and facilities as are needed for the purpose, and to make progress reports from time to time of the results thereof.

Approved May 1, 1936 (ch. 267, 49 Stat. 1256).

The preliminary steps taken in compliance with this resolution are referred to in the annual reports for the fiscal years 1936 and 1937.

On July 1, 1937, a special engineering section was established in the Canal organization for the conduct of the work required by the resolution. The section was organized by the transfer of suitable qualified men from other divisions of the Canal organization. Near the end of the year three specialists were employed from outside the regular organization, including a consulting geologist who has served the Canal on two previous occasions; a permanent geologist for continuous study; and a specialist in locks' design.

The work done during the year included the assembly, classification, and analysis of existing records on topography; sub-surface exploration; hydrography; and similar basic subjects. A similar undertaking covering the field of pertinent technical literature has been started in cooperation with the Corps of Engineers of the War Department. A series of tests was commenced to establish the present condition of the concrete in the existing locks, after 25 years of service. Several apparently feasible locations for new locks and their approach channels were selected tentatively and rough preliminary estimates of costs were prepared to assist in the determination

of the most desirable locations for further investigation. Examination of existing topographical maps having developed their insufficiency for the consideration of these locations in certain areas, a topographical mapping program was initiated. The present program is limited to critical areas on the east side of the Canal between Gatun Lake and Mindi at the Atlantic end of the Canal, and on the west side of the Canal from Paraíso to Balboa at the Pacific end. The new topographical maps are on a scale of 1:1000, with a contour interval of 5 feet. By the end of the year, 2,033 acres, constituting about 75 percent of the present mapping program, had been completed. A general basic geological examination, to extend the existing geological information over the new areas proposed for lock locations, was begun in June.

The expenditures for the year amounted to \$34,600.05. The work done was closely circumscribed by the small allotment which it was possible to make available for these investigations for the year. But a systematic approach has been initiated, purposely pursued at a slow rate so as to insure that each move would count toward the solution of the problem, and the way has been prepared for more rapid progress with the application of adequate funds. Considering the amount that must be expended in order to explore fully, locate, design, model test, and report on the project to make ready for construction, it is evident that the work is now only in its very beginning.

However, studies have progressed to the point where it is clear that this project is closely related to the defense of the Canal. Consequently, it is of the utmost importance that a determination be made as early as possible, as to whether it is feasible to construct additional locks at a much greater distance from the present locks than has heretofore been contemplated. Therefore, funds available for this work for next year should be considerably increased.

SECTION IV GOVERNMENT

The civil government of the Canal Zone is conducted as prescribed in the Panama Canal Act of August 24, 1912, and subsequent acts and Executive orders made applicable to the Canal Zone. Whenever it has been practicable to assign governmental functions to departments in the organization established for the operation and maintenance of the Canal, this has been done. Complete cooperation and greater economy and efficiency are derived from such coordination of functions.

Data on the expense and revenues of various features of the Canal operation and government are shown in the financial and statistical statements in section V of this report.

AREA OF THE CANAL

The total area of the Canal Zone and the areas segregated for various purposes, as of June 30, 1938, are shown herewith:

	<i>Square miles</i>
Total area of the Canal Zone-----	552.80
Land area of Canal Zone-----	361.86
Water area of Canal Zone (inclusive of Madden Lake to +260-foot contour)-----	190.94
Land areas—military and naval reservations (inclusive of revocable-license area):	
Military reservations-----	51.37
Naval reservations-----	7.52
	58.89
Land areas, Canal Zone townsites (exclusive of Army and Navy posts)-----	12.29
Barro Colorado Island-----	5.71
Forest preserve-----	5.47
Swamps-----	16.50
Cattle pastures-----	63.00
Commercial farms-----	.57
Usable land-----	199.43
Total land area as above-----	361.86

POPULATION

A house-to-house canvass of the civil population of the Canal Zone including employees of the Army and members of families of Army and Navy personnel, omitting only commissioned, warrant, and enlisted

personnel, was made by the police force during the month of June 1938. A summary is presented as follows:

District	Amerieans			All others			Total
	Men	Women	Children	Men	Women	Children	
Balboa.....	2,188	2,442	2,136	3,756	2,720	4,947	18,189
Cristobal.....	468	720	732	2,779	2,003	4,057	10,759
Prisoners.....	7	0	0	101	1	6	115
Total.....	2,663	3,162	2,868	6,636	4,724	9,010	29,063

Many employees of the Panama Canal and the Panama Railroad on the Atlantic side live in United States Government quarters in New Cristobal and Colon Beach, which are in the Republic of Panama. Consequently they are not included in the above tabulation.

The foregoing total indicates an increase of 356 as compared with the 28,707 population reported in June 1937. Corresponding figures for earlier years are: 1932, 30,980; 1933, 31,839; 1934, 29,964; 1935, 29,636; 1936, 29,190, and 1937, 28,707. Of the 29,063 civil population living in the Canal Zone in June 1938, a total of 7,146 was employed by the Panama Canal and Panama Railroad Co.; of these, 2,601 were Americans and 4,545 were aliens. Approximately 700 Americans and approximately 5,000 alien employees live outside the Canal Zone.

PUBLIC HEALTH

General health conditions in the Canal Zone and in the two terminal cities of Panama and Colon in the Republic of Panama have remained normal. Malaria continues to be the most important disease on the Isthmus, although no employee has died of malaria in the past 5 fiscal years.

Sanitation of the Navy reservations at Summit and on the west side of the Canal has been continued. The reservation on the west side of the Canal includes the Victoria dump area. The last dredging into this area began in November 1936, and was discontinued in March 1938. Three-quarters of a square mile was filled to a depth of over 6 feet, filling what was formerly a mangrove swamp to above the level of high tide. The fill blocked the outflow of several streams, and a number of times during the year the impounded water allowed extensive mosquito breeding which was controlled with difficulty by oiling and dusting with paris green. On several occasions it was necessary to scatter the dust from an airplane, as the breeding areas were large and it was not possible to reach them on foot or from boats. The airplane dusting was performed by Army planes from Albrook Field. A channel for the streams entering this area has been established

between the mud flats and the higher ground, which will simplify the control of mosquito breeding.

A nurses' home was built at the Corozal Hospital, and the second dormitory building was completed at Palo Seco. The dormitory was built in conformity with the plan to construct one dormitory each year, replacing the old buildings which have deteriorated.

The number of patients treated in the Panama Canal hospitals continues to increase, which has required the employment of additional personnel to care for them. The steady increase in the past few years is shown under vital statistics.

The school physician has continued with the physical examination of the pupils and has followed up the correction of defects. A formal course in first aid was added for the older children. Fourteen lectures on various phases of public health were given by members of the health department. The work of the school physician has improved the community knowledge of health measures.

The health offices which are maintained in the terminal cities of Colon and Panama by the health department have continued to operate satisfactorily. City-wide clean-up campaigns were inaugurated through the public press preceding and during the Olympic games, with very satisfactory response from the citizens of Colon and Panama City. Constant inspection of buildings, restaurants, dairies, and milk plants has been continued. The dairies, while outside the limits of the cities, are under the supervision of health department veterinarians, who have received excellent cooperation from the dairymen in their efforts to increase the quality of milk. Mosquito control and rat control have been active; garbage collection and street cleaning have continued in an economical manner; and, with the exception of a number of mild cases of measles, mumps, and whooping cough, there were no epidemics of contagious diseases.

In October 1937, three cases of smallpox, in the eruptive stage of the disease, entered Colon from the San Blas coast. The city of Colon had been revaccinated in 1934 and with the continued vaccination of infants and school children, attained such a high level of protection that no secondary cases occurred. The usual precautions were taken, however, on all persons arriving from infected areas. The Department of Beneficence, Republic of Panama, took prompt measures to vaccinate the population in the San Blas province and the epidemic there subsided. As mass vaccination in the city of Panama was last done in 1933, the city was covered by a house-to-house canvass from April to June 1938, and those persons not protected were vaccinated. The municipal authorities cooperated fully.

VITAL STATISTICS

The morbidity and mortality rates from diseases and injuries and other vital statistics relating to the populations of the Canal Zone and the cities of Panama and Colon, are set forth in detail in the calendar-year report of the health department, which is published annually in pamphlet form. For this reason, most of the tables are omitted from this report, and the data pertaining to vital statistics are limited to a brief résumé of death rates, birth rates, and infant mortality rates.

General death rate.—The death rate from all causes in the calendar year 1937 rose slightly over the preceding year, but has shown little change since 1934, when it dropped below 7 per 1,000 for the first time. The death rate is artificially low because many of the older employees retire and leave the Isthmus and because the population includes a large number of young soldiers. For Panama City the rate has altered very little, averaging 13.68 for the past 5 years. Colon has consistently run a slightly higher death rate, averaging 14.65 for the same period. Below are shown death rates by yearly periods for the past 5 years:

Death rates per 1,000 of population—all causes

Calendar year	1933	1934	1935	1936	1937
Canal Zone.....	7.12	6.43	5.89	5.62	6.24
Panama City.....	14.95	12.70	12.61	14.44	13.72
Colon.....	16.27	14.83	12.90	14.60	14.53

Birth rate.—The birth rate in the Canal Zone is low, as the white population includes a large number of enlisted men in the Army. The black population includes a high proportion of employees in the older age group, as only employees of more than average service are able to secure an assignment of quarters in the Canal Zone. The following table shows the birth rates in the Canal Zone and in the terminal cities of Panama and Colon for the past 5 calendar years:

Live birth rate per 1,000 population

Calendar year	1933	1934	1935	1936	1937
Canal Zone:					
White.....	8.85	7.79	7.52	6.25	7.18
Black.....	13.15	13.41	15.10	16.03	15.88
Combined.....	10.78	10.80	11.35	10.91	11.20
Panama City.....	31.75	30.41	30.69	35.46	33.73
Colon.....	26.97	29.03	29.63	31.50	31.85

Death rate among children under 1 year of age.—The following table shows the infant-mortality rates, by yearly periods, from 1933 to 1937:

Deaths of infants under 1 year, per 1,000 live births

Calendar year	1933	1934	1935	1936	1937
Canal Zone:					
White-----	34	49	32	35	12
Black-----	101	66	59	63	97
Combined-----	76	60	50	54	68
Panama City-----	118	112	90	93	95
Colon-----	115	124	76	89	77

Principal causes of death.—The principal causes of death in each of the three groups of the population were as follows:

Number of deaths and annual rate per 1,000 population, calendar year 1937

Causes of death	Canal Zone		Panama City		Colon	
	Number	Rate per 1,000	Number	Rate per 1,000	Number	Rate per 1,000
Organic diseases of the heart-----	36	0.83	95	1.10	36	1.20
Pneumonia (bronchial and lobar)-----	26	.60	172	2.00	61	2.03
Diseases of the arteries-----	25	.58	42	.49	28	.93
Cancer (various organs)-----	22	.51	72	.84	26	.87
Tuberculosis (various organs)-----	18	.41	211	2.45	70	2.33
Apoplexy-----	18	.41	29	.34	17	.57
Nephritis (acute and chronic)-----	5	.12	58	.67	28	.93
Diarrhea and enteritis-----	2	.05	72	.84	21	.70

MALARIA

Malarial rates per 1,000 employees of the Canal and the Railroad for the past 10 calendar years are shown in the following table:

Year	Rate	Year	Rate
1928-----	14	1933-----	27
1929-----	21	1934-----	16
1930-----	26	1935-----	15
1931-----	19	1936-----	12
1932-----	14	1937-----	12

HOSPITALS AND DISPENSARIES

The number of patient-days in Panama Canal hospitals for the past 3 calendar years was as follows:

	1935	1936	1937
Gorgas Hospital-----	157,224	164,259	171,045
Corozal Hospital:			
Insane-----	67,473	69,477	68,261
Cripples and chronic medical and surgical cases-----	42,346	43,417	41,430
Colon Hospital-----	30,891	32,151	33,016
Palo Seco leper colony-----	38,691	38,664	38,983
Total-----	336,625	347,968	352,735

QUARANTINE AND IMMIGRATION

Inspection was made of 6,486 vessels and 644 airplanes as compared with 6,311 vessels and 657 airplanes during the preceding year, and 106 vessels availed themselves of the "special demand" night boarding service, as compared with 131 last year.

The extension and spread of Asiatic cholera in China and Japan during the year has been the only significant change of major importance in international health, which might reflect itself into the Canal Zone or into countries touched by vessels transiting the Canal. The short incubation period of cholera of from 1 to 5 days, is such that should an infected ship leave an oriental port, the development of clinical cases aboard would occur on the high seas and ample warning would be available before the ship entered Canal ports. Quarantine inspections of ships from the Orient have revealed no suspicious cases. The Canal Zone Board of Health laboratory has recently amplified its diagnostic facilities in order to expeditiously handle the personnel of a suspected ship.

Bubonic plague has continued to be present in approximately the same ports of South America as last year. With continued vigilance it is not considered that the infected ports constitute more than a potential threat. Fumigation of rat-infested ships has continued and antirat work along the water front has been somewhat amplified.

Yellow fever, of the so-called jungle type, continues to exist in several geographic areas in South America; the threat of extension northward of this disease depends largely upon the airplane, and the danger has been considerably reduced by the vaccination of flying personnel and quarantine inspection of passengers whose recent travels have carried them through infected areas. To reduce the possibility of introducing this disease into the Zone, antimosquito measures near air ports have continued to be directed to reducing to a minimum the *Aedes aegypti*, the mosquito most likely to spread the disease.

The activities of the quarantine and immigration division during the fiscal year 1938 are summarized in the following table:

	1936	1937	1938
Vessels inspected and passed.....	6,298	6,311	6,486
Vessels granted pratique by radio.....	225	106	122
Total.....	6,523	6,417	6,608
Crew passed at quarantine.....	369,948	365,442	368,955
Crew passed by radio.....	68,340	32,694	29,751
Passengers passed at quarantine.....	141,768	159,470	148,056
Passengers passed by radio.....	4,322	2,131	5,817
Total.....	584,378	559,737	552,579
Airplanes inspected and passed.....	470	657	644

	1936	1937	1938
Crew of airplanes inspected and passed.....	1,564	2,171	2,752
Passengers of airplanes inspected and passed.....	2,377	4,224	4,022
Total.....	3,941	6,395	6,774
Vessels detained in quarantine.....	2	-----	-----
Crew detained on board ship for quarantine.....	96	-----	-----
Immigration cases admitted to station.....	1,216	1,384	1,183
Number of detention days.....	6,081	13,355	9,453
Persons held for investigation and released.....	190	451	325
Persons deported under immigration laws.....	929	937	1,017
Supplementary inspection of vessels.....	4,047	3,807	3,674
Vessels fumigated.....	67	69	64
Box cars fumigated.....	253	246	255
Number of "special demand" night boardings.....	158	131	113

MUNICIPAL ENGINEERING

Municipal work carried on during the year included the construction and maintenance of roads, streets, and sidewalks, the maintenance and operation of water and sewer systems, and miscellaneous construction jobs of various kinds.

TESTING LABORATORY

A well-equipped laboratory was maintained for the making of chemical and bacteriological analyses of water, chemical analyses of different materials, concrete tests, tests for selection of suitable aggregates for concrete, tests to determine the suitability of different materials and supplies for Canal uses, soil and permeability tests, etc.

During the fiscal year the testing laboratory carried on a variety of work, making a total of 10,971 tests in connection with 6,704 varied samples. This included 2,883 tests on water and more than 4,500 tests on concrete for various purposes. Other tests were made on building materials, clay and soil, gas, oils, storage batteries, etc., while inspections were made of swimming pools, ships, tanks, etc.

WATER SYSTEM

Consumption of water for municipal uses during the past 3 fiscal years has been as follows:

	1936	1937	1938
Canal Zone.....	<i>Gallons</i>	<i>Gallons</i>	<i>Gallons</i>
City of Panama.....	3,202,190,880	3,109,912,000	3,519,332,000
City of Colon.....	1,536,562,000	1,604,878,000	1,568,202,000
Sales to vessels.....	839,967,000	887,277,600	807,194,000
Total.....	5,757,889,500	5,784,922,000	6,079,509,000

The following statement shows the quantity of water pumped at each of the pumping stations during the year, the average per month, and the cost of pumping per thousand gallons:

Pumping station	Total gallons pumped during year	Average gallons per month	Average cost per 1,000 gallons for pumping
Gamboa (intake).....	3,709,338,000	309,112,000	\$0.0156
Miraflores (relay).....	665,730,000	55,478,000	.0219
Balboa (relay).....	2,697,587,000	224,799,000	.0161
Paraiso (relay).....	115,171,000	9,595,000	.0356
Mount Hope (intake).....	1,951,310,000	162,609,000	.0210
Acua Clara (intake).....	354,215,000	29,517,000	.0731
Monte Lirio (intake).....	1,300,000	109,000	.7122
Frijoles (intake).....	4,104,000	342,000	.4920
Total.....	9,498,755,000	791,564,000	-----

Of the above stations those at Paraiso, Miraflores, and Balboa are relay stations. Omitting the water which was repumped from the total listed above, 6,020,267,000 gallons of raw water, an average of 501,689,000 gallons a month, were pumped by the municipal water system during the past year. This was done at an average over-all cost of \$0.03325 per thousand gallons as compared to an average cost of \$0.0340 per thousand gallons for the previous year.

The usual maintenance work was performed on the pipe lines, reservoirs, filtration plants, and pumping stations during the year. All pumps are electrically driven except those at Frijoles and Monte Lirio, which are driven by gasoline engines. Frijoles also has an auxiliary windmill which operates whenever there is sufficient wind movement.

In addition to regular maintenance, work was performed on the following special projects: The sedimentation basins at Mount Hope filtration plant were repaired and rebuilt; water mains were installed to provide fire protection for the Mount Hope oil tank farm; and a 12-inch water main was installed in La Boca, thus providing adequate pressure for fire protection at the La Boca oil tank farm and an adequate supply and pressure to activities on the west side of the Canal.

SEWER SYSTEM

In addition to the regular maintenance work, primer pumps for the New Cristobal sump pumping station were purchased and installed.

ROADS, STREETS, AND SIDEWALKS

In addition to maintenance work performed on the roads, streets, and sidewalks in the Canal Zone, many special projects were carried out during the year. The narrow streets and the increased traffic necessitated widening to 27 feet several of the streets in the Ancon-Balboa district. These included: Empire Street, Gorgona Road, Roosevelt Avenue, Barneby Street, San Blas Place, Tivoli Avenue, and portions of Anecon Boulevard and Carr Street.

GAMBOA PROJECT

Municipal work was continued during the fiscal year on the town-site of Gamboa. Facilities were provided for 52 new gold and 108 new silver apartments and 13 public buildings. A new swimming pool and a landing for small boats were constructed. The swimming pool represents a new design in the Canal Zone, as three separate pools were constructed instead of one pool with a sloping bottom. One of these pools is for wading, one is for diving, and one is a larger pool with dimensions intended to agree with the requirements of the Olympic games for swimming purposes. The new launch dock consists of one 10-foot section parallel to the shore and seven finger piers 5 feet wide by 50 feet long, 35 feet apart. Quantities of work accomplished during the year included 0.69 mile of sanitary sewer mains and laterals; 0.44 mile of storm sewers; 0.45 mile of water mains; 12,040 square yards of reinforced-concrete street paving; 8,523 square yards of paving for service walks, drives, and walks; 15,959 linear feet of concrete gutter around quarters and for surface drainage in the townsite, and 19,820 cubic yards of excavation.

DOCK 15, BALBOA

Necessity for the reconstruction of dock 15 at Balboa, and a brief explanation of the plans for the new dock will be found on pages 118 and 119 of the annual report, 1936. Work on pier 5 was completed by August 9, and 573 cubic yards of concrete were poured in the pier above the seal and the sheet piling extracted. Work on pier 1 was completed by September 1, with a total excavation of 4,300 cubic yards. A seal of 1,225 cubic yards was poured through tremies and 601 cubic yards of concrete were poured in the dry above the seal. Work on pier 7 commenced at the end of August and was completed by the middle of November, total excavation for this pier being 3,700 cubic yards. A seal of 1,326 cubic yards was poured through tremies and 572 cubic yards were poured in the dry above the seal. Work on pier 6 was begun September 15 and completed about the 1st of January, with a total excavation of 3,425 cubic yards. A seal of 1,425 cubic yards of concrete was poured through tremies and 582 cubic yards of concrete were poured in the dry above the seal. Work on the superstructure for the dock was begun in January. This comprised 1,563 tons of structural steel, fabricated in the States, erected by the municipal engineering division, and riveted by the mechanical division. All erection was completed early in April. Total expenditures for the current fiscal year on this project amounted to \$562,150.40. By the end of the fiscal year all work had been completed except the painting of the steel girders, the fender system, and the air and water piping.

CITIES OF COLON AND PANAMA

Regular maintenance was performed on the water and sewer systems and the streets during the year. In the city of Panama the following major projects were carried out: Paved sections of West Fifteenth, Sixteenth, and B Streets, and performed municipal work for widening Avenue B.

In the city of Colon the following major projects were carried out: Repaired sanitary sewer line on Justo Arosemena Avenue from Fourth to Tenth Streets, improved drainage in various locations in Colon, paved three blocks of Justo Arosemena Avenue, and installed storm sewer on Fourteenth Street.

MISCELLANEOUS PROJECTS

The area immediately south and west of Gorgas Hospital was developed to accommodate 11 or 12 additional houses for the hospital staff. The total cost of work performed during the past fiscal year was \$39,777.19.

PUBLIC ORDER

During the past fiscal year 3,151 persons were placed under arrest by the Canal Zone police, a decrease of 475 arrests as compared with the previous year, when 3,626 arrests had been made. Statistics covering these arrests, with corresponding arrests for the previous year, are covered in the following table:

	1937	1938
	Persons	Persons
Male.....	3,458	3,018
Female.....	168	133
Total.....	3,626	3,151
Arrests made with warrants.....	330	236
Arrests made without warrants.....	3,296	2,915
Total.....	3,626	3,151
Residents of Canal Zone.....	1,063	865
Residents of Panama.....	2,277	1,913
Transients.....	286	373
Total.....	3,626	3,151

There were 3,416 charges filed against persons arrested, of which 69, or approximately 2 percent, were felonies. Following were the principal causes of arrests:

Cause of arrest	1937	1938	Cause of arrest	1937	1938
Violation of vehicle traffic regulations.....	2,184	1,645	Vagrancy.....	160	125
Loitering.....	320	341	Fugitive from justice.....	122	117
Violation of immigration regulations.....	243	255	Battery.....	158	105
Disturbing the peace.....	141	139	Disorderly conduct.....	128	101
Petit larceny.....	132	131	All others.....	417	457
			Total.....	4,005	3,416

The persons arrested included nationals from 66 countries and territories and were of 181 different trades and professions. Arrests for homicide totaled 10 during the year. Five were due to automobile accidents. As a result of these five there was one conviction. In the other four cases, probable cause was not found, and the cases were dismissed in the magistrate's court. Three of the other arrests involved two hunting accidents, which resulted in jail sentences for the three defendants ranging from 3 months to 1 year, the latter sentence being suspended. Two seamen on transient ships were arrested for murder. In one case the charge was changed to voluntary manslaughter, and the defendant sentenced to 1 year at hard labor in the Gamboa penitentiary; in the other case, the charge was changed to involuntary manslaughter, but probable cause was not found, and the case was dismissed in the magistrate's court.

Suicides during the year numbered four, of which two were by drowning, one by shooting, and one by poison. The coroner investigated 50 deaths during the year, of which 15 were due to accidental drowning and 13 to natural causes.

The number of prisoners serving sentences in the common jails at the end of each month averaged slightly more than 56. All prisoners who were physically able were employed on municipal work, public improvements, janitor, and miscellaneous work at the police and fire stations, and at target ranges. The total value of such common-jail labor for the year was \$21,328.44.

Twenty-six convicts were committed to the Canal Zone penitentiary during the year, a decrease of 12 from the previous year, with aggregate sentences of 50 years 8½ months; 36 were discharged, and none was pardoned during the year. At the close of the year 55 remained in confinement as compared with 65 at the end of the preceding fiscal year. Labor performed by convicts was valued at \$29,483.79 on the basis of standard rates of pay. The convicts were employed on road and municipal improvement work, improvement and maintenance of prison grounds and buildings, manufacturing and repairing of prison clothing, and the cultivation of fruits and vegetables, etc., at the penitentiary farm and at the experiment gardens at Summit. The total value of fruits, vegetables, and other products of the penitentiary farm amounted to \$7,573.66, as compared to \$7,701.98 for the previous year.

Forty-eight persons were deported from the Canal Zone by the Governor during the year. Of this number, 31 were convicts who had completed terms of imprisonment, and 17 were persons who had been convicted of misdemeanor charges or who were deemed undesirable persons to be permitted to remain in the Canal Zone.

Traffic accidents reported in the Canal Zone during the year totaled 434, or an average of 36.17 per month, resulting in the deaths of 6 persons and injuries to 169 persons, of whom 50 were pedestrians.

Following is a classification of the causes of these accidents for the past 2 years:

Cause	1937	1938	Cause	1937	1938
Reckless driving.....	267	207	Defective vehicles.....	10	9
Negligent driving.....	131	122	All other.....	10	21
Careless pedestrians.....	25	27	Total.....	471	434
Inexperienced driver.....	15	27			
Intoxicated driver.....	13	21			

Detectives effected 124 arrests, and in addition made 672 investigations during the year. The usual routine work was carried on by the criminal identification bureau in cooperation with the Army and Navy and with other law-enforcement organizations and immigration authorities.

During the year three new buildings were completed and occupied: the magistrate's court in Balboa, the police substation in Gatun, and the police substation in Gamboa.

FIRE PROTECTION

During the year 111 fires, 11 false alarms, and 3 emergency calls were reported. The following table lists the owners on whose property these fires occurred and the extent of losses suffered, together with a comparison with the fires occurring in the previous year:

	1937		1938	
	Number of fires	Property loss	Number of fires	Property loss
Panama Canal.....	74	\$539	67	\$514
Panama Railroad Co.....	10	88	11	5
U. S. Army.....	2	18,200	7	700
U. S. Navy.....	1	0	1	0
Private.....	25	15,131	25	80,673
Total.....	112	33,958	111	81,892
Total value of property involved.....		\$2,241,048		\$3,611,155

Following are the two principal losses from fire reported in the Canal Zone during the past year, both of which occurred in private property: A fire was discovered in the hold of the M. S. *Santa Rita* while at sea, and the vessel was berthed at Cristobal on February 25, 1938, where the fire was extinguished. The damage to the cargo was estimated at \$50,000 and to the ship at \$100. A fire was likewise discovered in the hold of the M. S. *Lochmonar* while at sea and this vessel returned to Cristobal on February 12, 1938, where the fire was extinguished. The damage to the ship was estimated at \$5,000 and to the cargo at \$20,000.

MAGISTRATES' COURTS**BALBOA**

In the magistrate's court for the town and subdivision of Balboa, 21 civil and 1,946 criminal cases were disposed of, whereas a total of 2,557 cases had been disposed of during the previous year. In the criminal cases 1,688 resulted in conviction, 121 in acquittal, 78 were dismissed, and 59 were held for the district court. Imposition or execution of sentence was suspended in 138 cases and the defendants were placed on probation. Of this group eight were rearrested for violating the terms of probation and were returned to serve the sentence originally imposed.

CRISTOBAL

In the magistrate's court for the town and subdivision of Cristobal, 8 civil and 1,083 criminal cases were disposed of during the year, whereas 1,129 cases had been disposed of in the previous year. In the criminal cases 972 resulted in conviction, 56 in acquittal, 22 were dismissed, 7 were forfeited, and 26 were held to the district court. Although the misdemeanors and petty matters tried fell slightly in volume there was a decided drop in number of felonies and other matters sent up for trial to the United States District Court. Of the 51 sentences suspended during the year not a defendant returned to court for the breaking of his terms of probation.

PARDONS AND REPRIEVES

The pardon board, consisting of five members, acts under appointment of the Governor and in a purely advisory capacity. No changes in the personnel of the board were made during the year. During the year 36 applications for executive clemency were referred to the board. The exercise of executive clemency was recommended in 11 of these cases; in 24 cases denial of the application was recommended, and in one case the board was unable to agree upon a recommendation based upon a majority opinion.

PUBLIC SCHOOL SYSTEM

Except for the fact that in the Canal Zone the schools are situated in the various towns rather than in sections of a city, the school organization is comparable with the usual city school system in the United States, having a superintendent with assistants in general charge and a principal for each school.

It has been the practice for a number of years to make comparisons of enrollment from one year to the next on the basis of the number attending school at the end of February, as February is usually the peak month. The total number of regular pupils enrolled in February

of the past fiscal year, in both white and colored schools, was 6,160, which is a decrease of 67, or 1.1 percent, since February 1937. In the white schools the regular enrollment increased from 2,981 to 3,061, an increase of 80, or 2.7 percent, over the preceding year. In the colored schools enrollment dropped from 3,246 to 3,099, a decrease of 147, or 4.5 percent. Free school privileges are granted to silver employees of the Panama Canal and the Panama Railroad Co. only when employees reside on the Canal Zone. Colored school enrollment has shown a steady decline since 1932, the peak year, when the number enrolled in February was 4,149.

For the past 5 years average daily attendance has been as follows:

	1934	1935	1936	1937	1938
White schools.....	2,790	2,797	2,717	2,755	2,765
Colored schools.....	3,586	3,406	3,186	3,091	2,881
Total.....	6,376	6,203	5,903	5,846	5,646

The above does not include the enrollment in the Canal Zone junior college, which is covered in the following paragraphs.

The enrollment of 117 pupils in the junior college was the highest it has been for any year since its opening in the fiscal year 1934. The Canal Zone junior college is in a peculiar position in regard to the transfer of students. A junior college in the United States often draws students from a very limited area and transfers its students to higher institutions that are, as a rule, accredited by the same standardizing agency upon which the junior college is operating. This tends to make the problem of student transfer from one institution to another a rather simple one. The Canal Zone junior college, however, must prepare students for transfer to any college or university that they may desire to attend and for any line of studies that they may wish to pursue. The standard of work in the Canal Zone junior college has been such that the students have experienced no difficulty in making the transfer, provided that the individual's grades are satisfactory and that the student knows in advance what college he desires to enter and the course he wishes to follow after graduating from the junior college.

During the past year several junior college extension courses were scheduled in the late afternoon and evening primarily for the benefit of employed adults, offering courses in accounting, typewriting, stenography, higher mathematics, and Spanish. The large enrollment of 188 different persons in these classes is one indication of the interest shown in this service rendered by the junior college to the community.

Standard achievement tests are administered to all students at least once each year. The results secured not only provide information necessary to properly classify students but they furnish fairly accurate evidence of the general quality of instruction in the local schools

as compared to that in typical schools of the United States. In the grade schools these tests indicate that local standards of achievement are substantially above those in schools in the United States, while for the high schools the results show that the average Canal Zone student excels 65 percent of all the high school students who took the same tests in the United States.

A large program of activities is sponsored by the school and student body outside of the regular classroom. These activities consist of dramatics, public speaking and debating, dances, parties, and clubs of various kinds which are conducted by the students with the guidance and supervision of the faculty. The results obtained in music during the past year justified the increased emphasis that was put upon this phase of the secondary school program. About two-thirds of the pupils in the junior high schools and two-fifths of all the pupils in the senior high schools were enrolled in the music classes. The high school bands and orchestras made numerous public appearances which added much to the enjoyment of both the pupils and the community; examples of this were the music festivals held on both sides of the Isthmus about the 1st of May.

The Paraiso white school was abandoned in June 1937 and the Gamboa white elementary school was opened in September 1937. The new Balboa high school-junior college shop building was completed during the year and with the installation of machinery and other equipment will be ready for occupancy when school opens in September 1938. This building will provide shop facilities for the Balboa junior and senior high schools, the Canal Zone junior college, and the apprentice-learner school. Further details of this project were given on page 89 of last year's annual report.

The La Boca normal training school, which was established January 21, 1935, for the purpose of training teachers for the Canal Zone colored schools, graduated its first class on July 2, 1938. Of the 40 students originally selected for admittance from 353 applicants, 37 completed the 4-year course in 3½ years and received diplomas. With 37 teachers available for appointments, the normal school has been closed and will remain so until it is thought advisable to start a new class.

POSTAL SYSTEM

Thirteen post offices were in operation at the end of the year. These include seven post offices in civilian towns of the Canal Zone, five at United States Army posts, and one at Coco Solo, a station of the United States Navy. The new Balboa post office building, which appears ample for present and future needs, was completed and occupied during March. Work on the new Ancon post office is progressing rapidly, and it is believed that the building may be ready for occupancy by the 1st of January 1939.

There was no surplus from operations of the postal system for the fiscal year 1938. Operations for the past year are summarized and compared with the preceding fiscal year in the following table:

	1937	1938
Sales of postage stamps, postal cards, stamp books, etc.	\$279,112	\$269,385
Money-order fees	18,031	18,701
Box rents collected	17,572	17,933
All other receipts	11,328	11,024
Total receipts	326,043	317,043
Total expenses	319,674	317,043
Net surplus	6,369	0

The interest rate of 2 percent per annum on deposit money orders remained unchanged during the year. The new deposit forms were placed in use on July 1, 1937, with the maximum amount of any one of these orders increased from \$100 to \$1,000. Statistics covering the operation of the deposit and regular money orders are given in the following table:

	1937	1938
Deposit money orders:		
Money orders issued	number	28,001
Money orders issued	value	\$1,754,720
Money orders paid	number	29,195
Money orders paid	value	\$1,798,165
Funds on deposit at end of year		\$1,810,990
Regular money orders:		
Money orders issued	number	170,360
Money orders issued	value	\$3,114,995
Fees collected		\$18,031
Money orders paid	number	36,553
Money orders paid	value	\$379,898

Other statistics relative to the operation of the Canal Zone postal system are presented in the following table:

	1937	1938
Registered and insured articles dispatched:		
Official letters and parcels registered free	42,229	40,888
Foreign registered letters	29,017	27,830
Foreign registered parcels	3,808	2,914
Domestic registered letters	21,846	19,066
Domestic registered parcels	50	47
Insured and c. o. d. parcels	7,090	5,894
Total registered and insured articles dispatched	104,070	96,639
Registered and insured articles received:		
Registered articles	69,554	71,658
Insured and c. o. d. parcels	30,985	31,165
Foreign parcel post	5,027	4,620
Total registered and insured articles received	105,566	107,443
Dispatches of mail by steamer—Cristobal:		
Dispatches made to the United States	325	313
Dispatches made to foreign countries	1,807	1,634
Total dispatches made by steamer	2,132	1,947
Dispatches received from United States	803	711
Dispatches received from foreign countries	2,411	2,338
Total dispatches received by steamer	3,214	3,049
Dispatches of mail by steamers—Balboa:		
Total dispatches made	2,842	2,389
Total dispatches received	2,122	2,582

AIR MAIL

Air-mail schedules were changed twice during the year and the service speeded up so that there is now 12-hour service to Miami three times weekly. A third service from Miami, via Barranquilla, Colombia, was inaugurated during May, which rounded out the tri-weekly service between Cristobal and Miami. The triweekly service between Cristobal and Brownsville remained unchanged. Plans are now under way for further improvements in the service between Miami and Cristobal and for faster service from Cristobal to South America.

During December 1937 a 25 percent reduction was made in the postage rate for Canal Zone air mail to and via the United States and to Central American countries to which the former rate of 20 cents per half-ounce was applicable. This was done in conformity with a downward revision made by the United States Post Office Department for air-mail matter to all foreign countries which called for a 15-cent rate to the Canal Zone.

Sales of air-mail postage amounted to \$120,576 during the year, which, despite the 25 percent reduction in rates, was less by only \$2,155, or 1.8 percent, than during the previous year. Approximately 80 percent of the volume of Canal Zone air mail is destined to or via the United States.

The number of air-mail dispatches forwarded from Cristobal during the year was 5,672, and 11,793 were received, compared with 4,482 forwarded and 4,680 received during the previous year. This large increase in the number of dispatches handled was due to the fact that transfer operations, which had been handled at Barranquilla, Colombia, during the fiscal year 1937, were returned to Cristobal early in the fiscal year 1938. Dispatches were made to 57 exchange offices and received from 65.

IMMIGRATION VISAS

During the fiscal year 34 visas were issued by the executive secretary to alien residents of the Canal Zone traveling to the United States. Of these, 6 were quota visas, 16 were nonquota visas, and 12 were nonimmigration visas. Fees collected for visas amounted to \$233.

RELATIONS WITH PANAMA

During the year, correspondence was conducted between the Governments of the Canal Zone and the Republic of Panama with reference to various matters of local joint interest, arising from the relations of the two Governments and the proximity of their respective areas. The greater part of this correspondence was of a routine nature, dealing with matters relating to customs duties, immigration, repa-

triation of aliens, extradition, postal service, municipal improvements, public health, vital statistics, letters rogatory, and sales of land. Correspondence was also exchanged regarding navigation aids at Taboga Island and the San Blas Islands, Panamanian citizens in the Palo Seco leper colony, and the Olympic games.

CUSTOMS

The various activities of the bureau of customs were continued along the lines outlined in previous annual reports. The following is a statistical summary of the principal items, with the figures for the preceding year shown for comparison:

Item	Fiscal year 1937	Fiscal year 1938
Vessels entered.....	12,164	12,384
Vessels cleared.....	12,159	12,391
Aircraft entered.....	1,081	1,286
Aircraft cleared.....	1,081	1,287
Vessels of United States registry entered.....	3,834	4,006
Vessels of United States registry cleared.....	3,833	4,005
Customs releases on shipments consigned to Panama.....	13,881	13,448
Free-entry releases for shipments to employees of U. S. Government.....	6,323	6,051
Arrests for violation of Narcotic Drug Import and Export Act.....	1	0
Arrests for violation of customs regulations.....	2	20
Shipments of household goods of employees to United States, inspected and sealed for shipment to United States.....	91	68
Pieces of freight included in above.....	1,093	595
Invoices certified for shipment to United States.....	719	774
Special customs inspection out of regular hours:		
Cristobal.....	672	752
Balboa.....	473	475
Total.....	1,145	1,227
Fees collected for above.....	\$10,450	\$10,815
Cargo deposited to be held for orders (Canal Zone for orders):		
Cristobal:		
Consignments received.....	82	94
Releases for delivery or forwarding.....	460	492
Balboa:		
Consignments received.....	24	31
Releases for delivery or forwarding.....	130	167
Chinese passengers arriving.....	1,100	981
Chinese admitted to Panama.....	272	412
Vessels with Chinese crews checked.....	665	580

SHIPPING COMMISSIONER

The shipping commissioner and his deputies have the same authority as shipping commissioners in United States ports and United States consuls in foreign ports with respect to United States seamen. During the fiscal year, 2,486 seamen were shipped on vessels of the United States and 2,453 discharged. No sick or destitute seamen were returned to the United States at the expense of the appropriation for the relief of destitute American seamen, but 223 were signed as seamen or workaways and returned to the United States without expense to the Government.

The total wages earned by seamen who were discharged at Canal Zone ports amounted to \$134,034.94, and the total approved for deductions on account of advances, allotments, fines, slop-chest account, etc., was \$34,446.89. The balance of \$99,588.05 was either paid to seamen under the supervision of the deputy shipping commissioners or received on deposit for the seamen by the deputy shipping commissioners. The wages, money, and effects of one American seaman who died in a Canal Zone hospital were handled by the shipping commissioner during the year and remitted to the proper court in the United States for disposition.

ADMINISTRATION OF ESTATES

The public administrator takes charge of all estates within the Canal Zone which require administration and are not administered by others legally entitled to do so. In the case of estates with total assets exceeding \$1,000 value the public administrator charges the regular commissions fixed by law which are paid into the Treasury of the United States. Commissions amounting to \$1,719.09 were collected during the fiscal year. The estates of 153 deceased or insane persons, with cash assets of \$70,845, were settled, as compared with 139 estates, with cash assets of \$62,803, settled during the previous fiscal year. Twenty-four estates were in course of administration on June 30, 1938, and 22 additional cases were being investigated in which no money or property had yet been received.

LICENSES AND TAXES

Licenses issued for motor vehicles, permits for peddling foodstuffs, the sale of merchandise generally, ships' runners, and similar purposes numbered 13,031 for the year, and 3,871 motor-vehicle licenses were transferred during the year.

The number of motor-vehicle licenses and transfers and miscellaneous licenses issued during the past 10 years and the aggregate fees collected therefor are summarized below. These include licenses for official vehicles for which no charge is made.

Fiscal year	Motor-ve- hicle	Motor-ve- hicle transfers	Miscel- laneous	Total	Fees
1929	6,345	1,729	1,093	9,167	\$40,894
1930	7,280	1,862	1,064	10,206	45,604
1931	8,123	2,083	1,443	11,654	51,295
1932	8,577	1,906	1,312	11,795	52,143
1933	8,432	2,270	1,155	11,857	50,039
1934	8,389	2,311	1,392	12,092	52,796
1935	10,397	2,685	1,122	14,204	56,110
1936	10,268	3,276	1,258	14,802	61,482
1937	11,467	3,623	1,077	16,167	63,967
1938	11,885	3,871	1,146	16,902	66,574

FOREIGN CORPORATIONS

Foreign corporations doing business in the Canal Zone are required to secure licenses and for the past fiscal year 85 such corporations, the majority of which are steamship lines and steamship agencies, were licensed. Fees amounting to \$850 were collected. Taxes paid by corporations amounted to \$111.75.

INSURANCE

The license fee for insurance companies doing business in the Canal Zone is \$10 per year. At the end of the past fiscal year 13 insurance companies were licensed to write insurance in the Canal Zone. These companies reported that as of December 31, 1936, a total of 1,065 policies were in force. During the calendar year 1937, 181 policies were issued and 101 canceled, leaving 1,145 in force as of December 31, 1937, having an aggregate face value of \$3,743,555.67. Annual premium collections during the calendar year 1937 totaled \$191,301.44.

During the calendar year 1937 the premiums received by miscellaneous insurance companies, including accident, automobile liability, fire, surety, fidelity, etc., but excluding life insurance, amounted to \$59,063.69. Losses paid during the year totaled \$35,552.86.

The taxes of 1½ percent on premiums by all classes of insurance companies amounted to \$3,755.48 for the calendar year 1937, as compared with \$3,441.99 during the previous year.

COMMERCIAL AVIATION

The table below presents in brief a statistical picture of passenger, mail, and express cargoes carried by the various commercial airlines operating between the Canal Zone and North and South America, as well as the company operating in intra-Canal Zone air commerce. Comparisons are made with the cargoes carried in 1937.

	Pan American Airways, Pan American-Grace Airways, and Urabá, Medellín and Central Airways		Panama Airways (Isthmian)	
	1937	1938	1937	1938
NUMBER OF PASSENGERS				
Canal Zone and foreign:				
Incoming-----	1,932	3,660		
Outgoing-----	1,768	4,274		
Total-----	3,700	7,934		
Intra-Canal Zone: Passengers carried-----			5,204	4,947
AIR EXPRESS AND MAIL				
Air express and mail carried (pounds)-----	93,930	242,948		

A considerable increase in both passengers and freight over the amounts carried in 1937 is apparent, with the exception of Panama Airways. This is doubtless due in large part to an increase in the number of schedules by the operating companies, as well as the employment of much larger and faster aircraft. Panama Airways suffered considerably due to the removal of many of the large passenger liners from a schedule which included a stop in the Canal Zone.

Throughout the year the commercial airlines used the facilities of Albrook Field and France Field, of the Army, and the Pan-American Airways marine base at the Folks River inlet, Cristobal.

SECTION V

FINANCIAL AND STATISTICAL STATEMENTS

Financial statements of major interest relative to the operation of the Panama Canal are presented in this section. These statements are abstracted from the annual report of the accounting department of the Panama Canal.

ACCOUNTING SYSTEM

The accounting system inaugurated in 1932 on the recommendation of the Bureau of Efficiency to conform as nearly as practicable to the principles and practices approved by the Interstate Commerce Commission and State boards regulating public utilities was continued in effect during the fiscal year 1938 with such minor changes as were necessary to conform to changing conditions.

The accounting system fixed June 30, 1921, as the close of the construction and development period of the Panama Canal, and interest on United States Treasury funds advanced up to that date was capitalized. Capital interest subsequent to that date was considered a proper charge to operating expenses. Additions to the capital-investment account are made from time to time by the inclusion of the cost of new capital additions (such as Madden Dam); deductions are made of the amounts of withdrawals and retirements of capital assets, such as through the sale of property or the absorption of value of buildings or equipment through charges for depreciation. However, as stated on pages 114 and 115 of the annual report for the fiscal year 1937, at the beginning of the past fiscal year changes were made in the capitalized value, representing the investment of the United States Government in the Panama Canal. These changes were made on recommendation of the Committee on Panama Canal Tolls and Vessel Measurement Rules and approved by the President on August 17, 1937. For purposes of valuating the investment, the date of the opening of the Canal was changed from June 30, 1921, to July 12, 1920, the latter date being the date on which the Canal was formally declared open to commercial traffic by Presidential proclamation. This change resulted in a reduction in construction interest from \$143,652,360.43 to \$128,991,063, and transfer from capital to operating account of the annual payment to Panamá for 1921 amounting to \$250,000, a total capital reduction of \$14,911,297.43. In addition to this reduction in gross capital investment, accrued depreciation is

now deducted from gross capital before calculating interest to be returned on the investment.

Based on the foregoing principles the gross capital investment at the beginning of the fiscal year 1938 was \$538,160,472.92, and the net capital investment, after deducting accrued depreciation, was \$507,666,408.67. The net revenues of the Canal during the fiscal year 1938 amounted to \$13,909,903.26 on Canal operations and \$824,612.60 on business operations, a total of \$14,734,515.86. This net revenue is 2.90 percent of the net capital investment at the beginning of the year.

OPERATIONS OF THE PANAMA RAILROAD COMPANY

The results from the operations of the railroad proper and its various business units on the Isthmus are shown in detail in the accounts of the Panama Railroad Co. The detailed statement of revenue, expenses, and statistics for all railroad industries, changes in the capital account, and the results from the operations of the steamship line appear in the regular annual reports of the Panama Railroad Co. A review of these activities is presented in section II of this report under the heading "Business Operations Under the Panama Railroad Company."

The result from all Panama Railroad operations on the Isthmus during the fiscal year 1938 was a net revenue of \$1,183,453.40, as compared with \$1,358,595.79 for 1937, a decrease of \$175,142.39 for the year.

PANAMA CANAL OPERATIONS

The major financial results of Panama Canal operations are presented hereinafter in tables Nos. 1 to 27, with supplementary comments and explanations.

The following is a list of all of the tables and bureau reports contained in the annual report of the accounting department. The tables and reports Nos. 28 to 58, inclusive, are not printed because they are concerned principally with details of operations which lack general interest, and their publication would be an unwarranted expense. The complete report for the accounting department, as well as those of the other departments and divisions, is on file at the office of the Governor or at the Washington office of The Panama Canal. For purpose of reference, the complete list of tables and reports for the accounting department is printed below. Following the list are presented the major tables, Nos. 1 to 27, inclusive, with various notes of explanation.

INDEX TO TABLES

*Table**No.*

1. General balance sheet.
2. Canal general property.
3. Floating plant.
4. Business fixed property.
5. Business equipment.
6. Capital assets, depreciable and nondepreciable.
7. Public works, Republic of Panama.
8. Cash receipts and disbursements, appropriated funds.
9. Cash receipts and disbursements, custodial funds.
10. Accounts receivable, registered and outstanding.
11. Stores (material and supplies).
12. Work in progress.
13. Deferred charges.
14. Capital investment.
15. Accounts payable.
16. Depreciation reserves.
17. Reserve for repairs.
18. Reserve for leave.
19. Deferred credits.
20. Income, expenses, and net revenues (current).
21. Revenues, expenses, and computed surplus.
22. Capital refundments (miscellaneous receipts and Canal appropriations).
23. Balance of revenues and refundments.
24. Canal revenues.
25. Canal earnings, expenses, and net revenues.
26. Business revenues, expenses, and net revenues.
27. Balances in appropriation and fund accounts.

ADDENDA NOT PRINTED

28. Collections of United States funds by collector.
29. Cost of dredging.
30. Cost of electric current.
31. Cost of water.
32. Postal service—revenues, expenses, and surplus.
33. Postal service—money order funds balance sheet.
34. Postal service—money orders issued and paid, 1907 to 1938, inclusive.
35. Trust funds—receipts and disbursements.
36. Clubs and playgrounds—balance sheet.
37. Clubs and playgrounds—income and expenditures.
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|Rents and miscellaneous collections, silver employees.
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43. Accounts payable registered—Panama Canal.
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46. Injuries and deaths, Panama Canal and Panama Railroad.
47. Injuries and deaths—payments under various acts.
48. Damages to vessels.
49. Freight and cargo claims.

Table
No.

50. Shipments under Government Losses in Shipment Act (Pub., No. 192, 75th Cong.).
 51. Report of the Canal accounting bureau.
 52. Report of the Railroad accounting bureau.
 53. Report of the claims bureau.
 54. Report of the pay-roll section, claims bureau.
 55. Report of the auditing bureau.
 56. Report of the coupon accounting bureau.
 57. Report of the general bureau (mail, files, and employees' bonds).
 58. Report of the inspection bureau.

TABLE No. 1.—*General balance sheet, June 30, 1938*

ASSETS	
Capital assets:	
Canal general property (table No. 2).....	\$495,739,652.05
Floating plant (table No. 3).....	7,873,620.36
Business fixed property (table No. 4).....	28,554,596.28
Business equipment (table No. 5).....	3,313,604.55
Total capital assets.....	\$535,481,473.24
Reimbursable capital expenditures: Public works, Republic of Panama (table No. 7).....	1,092,674.49
Revenue due U. S. Treasury (table No. 9).....	138,380.50
Special funds:	
Security deposit funds (table No. 9).....	\$522,171.58
Trust funds (table No. 9).....	2,723,533.62
Total special funds.....	3,245,705.20
Working assets:	
Appropriated cash in U. S. Treasury (table No. 8).....	\$3,973,139.81
Appropriated cash with fiscal officers (table No. 8).....	1,730,391.08
Accounts receivable (table No. 10).....	681,121.70
Stores (table No. 11).....	4,982,867.99
Work in progress (table No. 12).....	135,144.03
Total working assets.....	11,502,664.61
Deferred charges (table No. 13).....	582,323.03
Total assets.....	552,043,221.07

LIABILITIES	
Capital investment:	
Net appropriations by Congress.....	\$411,703,084.73
Interest on appropriations.....	128,991,063.00
Total capital investment (table No. 14).....	540,694,147.73
Special fund obligations (see assets).....	3,245,705.20
Working liabilities: Accounts payable (table No. 15).....	1,269,902.27
Reserve for repairs (table No. 17).....	475,323.43
Reserve for leave (table No. 18).....	425,537.27
Deferred credits (table No. 19).....	253,835.42
Revenues and refundments:	
Net revenues to June 30, 1937 ¹	\$230,773,196.54
Net revenues, fiscal year 1938 (table No. 20).....	14,734,515.86
Total net revenues (table No. 21).....	245,507,712.40
Canal depreciation (table No. 16).....	21,364,393.43
Plant depreciation (table No. 16).....	10,982,931.80
Total.....	277,855,037.63
Less capital refundments (table No. 22).....	272,176,267.88
Balance of revenues and refundments (table No. 23).....	5,678,769.75
Total liabilities.....	552,043,221.07

¹ After deduction of \$250,000 incident to change in closing date of construction of Canal from 1921 to 1920 approved by President, Aug. 17, 1937.

The terms and arrangement of the foregoing balance sheet follow closely the generally accepted principles of corporate accounting, except as to the last item "Revenues and refundments." The statutes require that receipts for tolls, civil revenues, and net profits on business operations shall be covered into the United States Treasury, and relinquished from control of the Panama Canal.

Funds for current operating expenses and capital construction are appropriated by the Congress, and for accounting purposes are considered as provided from the tolls and other receipts covered into the Treasury. Practically all receipts other than those cited above are repayable to Canal appropriations, and may be reexpended, but as the Canal is deprived of tolls revenues, its principal source of income, the reexpendable receipts are insufficient to provide for operation and maintenance, thus requiring the Canal to submit its expenditure program annually to the Congress.

Total net revenues, appearing under the caption "Revenues and refundments," represent the accumulated operating earnings of the Panama Canal before capital interest charges. This net revenue, however, has been covered into the United States Treasury in the form of tolls and other receipts. It therefore follows that net capital refundments and net revenues earned will always be approximately the same, except for the fluctuation of unexpended appropriated cash and other working capital items.

These various fund requirements leave the Panama Canal balance sheet without an equivalent for the usual corporate "surplus account," since any surplus is included in the tolls covered into the Treasury, by law. However, the equivalent for "surplus account" is shown in table No. 21, which compares "Total net revenues" of \$245,507,712.40, appearing on the balance sheet, with the computed interest on the net capital investment, by fiscal years, beginning with 1921, but no interest charge against the Canal is actually made by the United States Treasury.

TABLE No. 2.—*Canal general property, fiscal year 1938*

	Balance July 1, 1937 (adjusted)	Additions and transfers	Retire- ments and transfers	Balance June 30, 1938
Channels, harbors, and basins:				
Balboa to Pedro Miguel.....	\$24,309,928.86	.....	.....	\$24,309,928.86
Pedro Miguel to Gatun.....	113,466,691.77	.....	.....	113,466,691.77
Gatun to Cristobal.....	12,829,445.51	.....	.....	12,829,445.51
Breakwaters:				
Naos Island.....	1,075,874.10	.....	.....	1,075,874.10
Colon—east.....	3,994,727.10	.....	.....	3,994,727.10
Colon—west.....	4,528,829.57	.....	.....	4,528,829.57
Locks:				
Miraflores.....	24,644,389.24	.....	.....	24,644,389.24
Pedro Miguel.....	16,770,362.46	.....	.....	16,770,362.46
Gatun.....	37,914,498.12	.....	.....	37,914,498.12
Floating caisson.....	347,868.15	.....	.....	347,868.15
Towing locomotives.....	1,506,726.53	.....	\$1,329.21	1,505,397.32

TABLE No. 2.—*Canal general property, fiscal year 1938—Continued*

	Balance July 1, 1937 (adjusted)	Additions and transfers	Retire- ments and transfers	Balance June 30, 1938
Dams:				
Miraflores.....	\$1,228,561.63			\$1,228,561.63
Pedro Miguel.....	457,302.32			457,302.32
Madden.....	9,735,287.90	\$29,087.33		9,764,375.23
Gatun.....	10,475,943.56			10,475,943.56
Gatun-Mindi levee.....	148,974.22			148,974.22
Spillways:				
Miraflores.....	1,398,684.94			1,398,684.94
Gatun.....	4,323,538.02			4,323,538.02
Aids to navigation:				
Channel aids.....	679,536.28			679,536.28
Transit aids.....	62,808.84			62,808.84
Coastal aids.....	175,069.78			175,069.78
Lighthouse depot.....	46,486.63			46,486.63
Wharves and piers:				
Balboa (Nos. 14 to 19).....	3,900,059.38			4,417,826.38
No. 15, reconstruction (completed).....		517,767.00		
Gamboa.....	234,828.91			274,589.81
Launch dock (part).....		39,760.90		
Cristobal (Nos. 6, 14, 15).....	2,753,278.57			2,753,278.57
Dry docks:				
Balboa.....	3,641,100.54			3,641,100.54
Cristobal.....	665,852.92			665,852.92
Coaling plants:				
Balboa.....	2,284,568.35			2,284,568.35
Cristobal.....	3,679,797.59			3,679,797.59
Dredging division plant.....	857,978.76			1,422,496.20
Storehouse, Gamboa.....		4,439.10	*	
Miscellaneous additions.....		947.01		
Wrecking crane No. 3, transfer.....		3,271.18		
Ferryboats, transfer.....		255,860.15		
Titles and treaty rights:				
Purchase price, New Panama Canal Co.....	1 31,717,335.97			31,717,335.97
Treaty payment to Republic of Panama, 1904.....	10,000,000.00			10,000,000.00
Annual treaty payments to Republic of Panama, 1913-20.....	2 2,000,000.00			2,000,000.00
Relocation, Panama Railroad.....	9,800,626.46			9,800,626.46
Reequipment of Panama Railroad.....	3,247,332.11			3,247,332.11
Depopulation, Canal Zone.....	2,701,016.24			2,701,016.24
General buildings and structures:				
Office buildings.....	2,137,559.96			2,102,599.08
Gamboa.....		39.12		
Cristobal, No. 1907, transferred.....			\$35,000.00	
Gorgas Hospital.....	1,801,871.49			1,801,871.49
Corozal Hospital.....	536,975.09			549,263.22
Nurses' quarters (completed).....			12,288.13	
Colon Hospital.....	314,615.86			314,615.86
Dispensaries.....	243,170.23			243,203.32
Gamboa (completed).....			33.09	
Palo Seco colony.....	97,176.07			109,762.61
Ward building, No. 18 (completed).....		22,508.78		
Building No. 24, strong room.....		380.19		
Patients' quarters, female, No. 21, retired.....			2,700.00	
Patients' quarters, male, No. 22, retired.....			2,202.43	
Patients' quarters, male, No. 27, retired.....			2,700.00	
Patients' quarters, male, No. 28, retired.....			2,700.00	
Quarantine stations.....	65,392.70			65,392.70
Other health department structures.....	97,801.94			115,556.30
Storehouse and shop, Panama City (completed).....		5,751.75		
Mortuary chapel, Corozal (part).....		9,498.50		
Storehouse, Gamboa (completed).....		2,504.11		
Clubs and playgrounds.....	776,335.39			996,138.63
Gymnasium, Balboa (part).....		48,942.95		
Gold clubhouse, Gamboa.....		52,975.93		
Silver clubhouse, Gamboa.....		32,160.74		
Playshed, Gamboa.....		23,629.37		
Swimming pool, Gamboa.....		25,595.39		

Footnotes at end of table.

TABLE No. 2.—*Canal general property, fiscal year 1938—Continued*

	Balance July 1, 1937 (adjusted)	Additions and transfers	Retire- ments and transfers	Balance June 30, 1938
General buildings and structures—Contd.				
Clubs and playgrounds—Continued.				
Bathhouse, Gamboa.....	\$11,613.36			
Grandstand, pool, Gamboa.....	2,462.75			
Grandstand, baseball, Gamboa.....	3,897.67			
Playshed, Gatun (part).....	29,912.71			
Auditorium, Cristobal.....	7,562.37			
Gold clubhouse, No. 1604, Cristobal, retired.....			\$19,250.00	
Post offices.....	\$61,327.94			\$161,979.81
Aneon (part).....	37,022.40			
Balboa (completed).....	61,279.64			
Gamboa.....	16,809.83			
Aneon, No. 339, retired.....			4,560.00	
Balboa, No. 802, retired.....			9,900.00	
Schoolhouses.....	1,750,435.43			1,816,306.47
Shop school building, Balboa (part).....		57,347.00		
Gold schoolhouse, Gamboa (com- pleted).....		8,426.21		
Silver schoolhouse, Gamboa (com- pleted).....		97.80		
Fire stations.....	126,133.14			126,148.52
Gamboa (completed).....		15.38		
Police stations.....	190,281.07			202,661.84
Balboa, No. 708, transferred.....			12,725.81	
Gamboa, No. 92, retired.....			760.00	
Gamboa.....		18,613.74		
Gatun (completed).....		7,252.84		
Prisons.....	30,000.00			30,000.00
Courthouses.....	181,330.92			187,732.73
Magistrate's court, Balboa (completed).....		6,401.81		
General storehouses.....	1,210,605.44			1,236,150.40
Valve storage shed, Balboa (completed).....		1,514.66		
Gamboa storehouse (completed).....		263.44		
Lumber shed, Gamboa (completed).....		71.49		
Oil and paint store, Gamboa.....		13,970.29		
Storehouse office, Gamboa.....		3,030.01		
Store for inflammables, Mount Hope.....		6,695.07		
Other buildings and structures.....	278,177.82			297,253.65
Balboa, No. 708, transfer.....		12,725.81		
Gamboa, No. 58.....		6,350.02		
Permanent town sites.....	1,727,324.46			1,806,513.92
Ancón.....		15,901.08		
Balboa.....		1,865.44		
Gamboa.....		61,422.94		
Roads, streets, and sidewalks.....	4,966,059.15			5,061,702.73
Streets, Ancón.....		15,811.88		
Streets, Balboa.....		8,791.52		
Gaillard Highway.....		3,070.00		
Streets, Gamboa.....		58,076.55		
Sidewalks, Gamboa.....		9,893.63		
Sewer system.....	706,098.43			727,807.64
Ancón.....		4,294.47		
Balboa.....		1,167.07		
Gamboa.....		16,247.67		
Street lighting system.....	183,090.82			198,381.87
Balboa.....		1,401.63		
Gamboa.....		13,889.42		
Plans for increasing capacity of Canal.....	2128,991,063.00		34,600.05	34,600.05
Interest during construction period.....				128,991,063.00
Undistributed improvements.....		107,831.42		107,831.42
Total, Canal general property.....	494,078,137.68	1,755,341.82	93,827.45	495,739,652.05

¹ Original purchase price of \$40,000,000 less Panama Railroad Co. capital stock and sales and transfers of property acquired.

² After deduction of \$250,000 for payment to Republic of Panama and \$14,661,207.43 for interest during construction period incident to change in closing date of construction of Canal from 1921 to 1920 approved by the President, Aug. 17, 1937.

TABLE No. 3.—*Floating plant, fiscal year 1938*

	Balance July 1, 1937	Additions and transfers	Retire- ments and transfers	Balance June 30, 1938
Tugs and craneboats	\$2,653,487.65			\$2,716,785.47
<i>Gatun</i> (completed)		\$113,713.82		
<i>Cocoli</i> , retired			\$20,416.00	
<i>La Valley</i> , retired			30,000.00	
Ferryboats	255,860.15			
Transferred			255,860.15	
Launches	358,185.54			387,933.64
<i>Kingbird</i> , addition		3,233.43		
<i>Jessop</i> , addition		790.28		
<i>Shearwater</i> , new		16,915.40		
<i>Guichiche</i> , new		7,143.15		
<i>Bass</i> , new		13,665.84		
<i>Cone</i> , retired			12,000.00	
Dredges	2,570,236.01			2,570,236.01
Dump scows	1,477,357.65			1,480,484.75
<i>No. 141</i>		24,827.10	21,700.00	
Machine barges	535,794.89			541,982.42
Relay barge, 24-inch (part)		6,187.53		
Lighters	155,503.35			176,198.07
Oil barge (part)		20,694.72		
Total, floating plant	8,006,425.24	207,171.27	339,976.15	7,873,620.36

TABLE No. 4.—*Business fixed property, fiscal year 1938*

	Balance July 1, 1937	Additions and trans- fers	Retire- ments and transfers	Balance June 30, 1938
Hydroelectric plant, <i>Gatun</i>	\$1,763,769.90			\$1,755,785.01
Regulators and exciters (completed)		\$5,990.90		
Regulators and exciters, retired			\$13,975.79	
Diesel electric plant, <i>Miraflores</i>	1,525,616.79			1,525,616.79
Substations	1,416,110.41			1,423,295.73
<i>Summit</i> , transfer		19,732.05		
<i>Fort Sherman</i> , transferred			12,546.73	
Transmission system	1,306,947.80			1,560,695.81
<i>Madden</i> power line, transfer		253,748.01		
Distribution system	1,572,098.76			1,613,799.66
<i>Ancon-Balboa</i> , additions		7,872.34		
<i>Corozal</i> , additions		1,509.46		
<i>Gamboa</i> , additions		19,772.37		
<i>Fort Sherman</i> , transfer		12,546.73		
Madden dam system	1,568,758.73			1,295,278.67
<i>Madden</i> power line, transferred		253,748.01		
<i>Summit</i> substation, transferred		19,732.05		
Total, electric light and power system	9,153,302.39	321,171.86	300,002.58	9,174,471.67
Electric work	202,842.24			236,129.71
<i>Wireman's shop, Gamboa</i>		13,487.47		
<i>Building No. 1907, Cristobal</i> , transfer		19,800.00		
Zone water system	1,058,199.38			1,102,694.83
<i>Cone valve and wash water controller</i>				
<i>Mount Hope filter plant (part)</i>		1,851.55		
<i>Concrete tank, Gamboa (completed)</i>		477.62		
<i>Water mains, Paraíso-Gamboa, adjusted</i>			2,973.26	
<i>Distribution lines</i> :				
<i>Balboa</i>		19,470.76		
<i>Gamboa</i>		8,852.06		
<i>Mount Hope</i>		16,816.72		
Zone-Panama water system	1,919,729.57			1,926,177.61
<i>Air compressor, Miraflores filter plant (completed)</i>		6,448.04		
Zone-Colon water system	786,778.00			786,778.00
<i>Sedimentation basin, Mount Hope filter plant, replaced</i>		18,089.86	18,089.86	
Total, water system	3,764,706.95	72,006.61	21,063.12	3,815,650.44
Municipal engineering work	8,812.79			24,012.79
<i>Building 1907, Cristobal, transfer</i>		15,200.00		

TABLE No. 4.—*Business fixed property, fiscal year 1938—Continued*

	Balance July 1, 1937	Additions and transfers	Retirements and transfers	Balance June 30, 1938
Balboa shops	\$2,445,534.82			\$2,479,497.85
Oxyacetylene plant (completed)		\$17,078.15		
Rigger shop (part)		41,614.41		
Boiler shop No. 16, extension		3,200.00		
Railroad shop equipment, transferred			\$27,929.53	
580,866.47				580,866.47
Cristobal shops				
Total, mechanical shops	3,026,401.29	61,892.56	27,929.53	3,060,364.32
Balboa fuel oil plant	825,322.41			827,164.75
Oil lines, replaced		17,600.52	18,715.00	
Dock 4, alterations (part)		2,956.82		
Cristobal fuel oil plant	1,181,411.49			1,181,411.49
Total, fuel oil plants	2,006,733.90	20,557.34	18,715.00	2,008,576.24
Motor transportation	122,692.09			147,852.79
Garage and shops, Ancon (completed)		173,390.93		
Garage and shops, Ancon transferred			134,986.08	
Garage building, Gamboa (completed)		1,612.44		
Corral, Ancon, retired			14,856.59	
21,335.31				127,214.47
Motorcar repair shops				
Repair and paint shops, Ancon, transferred		116,356.08		
Old shops, Ancon, retired			10,476.92	
58,067.51				74,461.38
Building division				
Shop building No. 59, Pedro Miguel (completed)		5,943.43		
Building No. 58, Gamboa		9,535.31		
Shop building, No. 35, Gatun, replaced		3,075.13	2,160.00	
Gold quarters	7,810,427.33			8,279,998.42
New quarters, Gamboa		472,193.71		
Building No. 468, Ancon, purchased		3,225.00		
Miscellaneous additions		15,101.72		
Retirements, various			20,949.34	
Silver quarters	1,052,884.40			1,166,404.74
New quarters, Gamboa		141,173.18		
Conversion of school, Gamboa		3,947.16		
Retirements, various			31,600.00	
Rented buildings	393,341.37			390,978.62
Garage stalls, Cristobal		2,479.24		
Garage stalls, Ancon, retired			887.15	
Garage stalls, Gatun, retired			3,954.84	
District quartermasters' supplies	46,219.64			48,480.69
Gasoline station, Gamboa, adjusted		7.46	3,218.87	
Gasoline station, Gatun, replaced		5,622.46	150.00	
Total, business fixed property	27,667,767.21	1,477,779.09	590,950.02	28,554,596.28

TABLE No. 5.—*Business equipment, fiscal year 1938*

	Balance July 1, 1937	Additions and transfers	Retirements and transfers	Balance June 30, 1938
Electric power system	\$232,309.13			\$247,909.42
Electric ranges and water heaters		\$16,117.79		
Electric refrigerators, retired			8517.50	
Electric work	9,981.85			9,981.85
Municipal engineering work	281,660.18	25,354.72	300.00	306,714.90
Mechanical shops	1,879,519.20	142,595.05	55,721.99	1,966,392.26
General storehouses	106,794.38	3,980.88		110,775.26
Motor transportation	425,853.72			433,794.35
Motor vehicles:				
Purchased		101,741.26		
Retired			93,800.63	
Motorcar repair shops	33,295.70	15,560.00		48,855.70
Building division	71,233.71	9,258.32		80,492.03
Panama Canal Press	81,698.20	6,723.30	267.58	88,153.92
District quartermasters' supplies	14,620.06			18,417.36
Gasoline station equipment		3,797.30		
Farm Bureau	2,117.50			2,117.50
Total, business equipment	3,139,083.63	325,128.62	150,607.70	3,313,604.55

TABLE No. 6.—*Capital assets, depreciable and nondepreciable, fiscal year 1938*

	Depreciable	Nondepreciable ¹	Balance June 30, 1938
Canal general property:			
Channels, harbors, and basins	\$150,606,066.14		\$150,606,066.14
Breakwaters	9,599,430.77		9,599,430.77
Locks	65,906,283.00	15,276,232.29	81,182,515.29
Dams:			
Madden	5,499,881.04	4,264,494.19	9,764,375.23
Other	3,791,569.33	1,930,653.63	12,310,781.73
Spillways	963,901.53		963,901.53
Aids to navigation	7,445,694.76		7,445,694.76
Wharves and piers	3,328,531.92	978,421.54	4,306,953.46
Drydocks	5,964,365.94		5,964,365.94
Coaling plants	1,122,496.20		1,122,496.20
Dredging division plant		59,466,310.78	59,466,310.78
Titles and treaty rights	2,102,599.08		2,102,599.08
Office buildings	1,801,871.49		1,801,871.49
Gorgas Hospital	549,263.22		549,263.22
Corozal Hospital	314,615.86		314,615.86
Colon Hospital	243,203.32		243,203.32
Dispensaries	109,762.61		109,762.61
Palo Seco colony	65,392.70		65,392.70
Quarantine stations	115,556.30		115,556.30
Other health department structures	996,138.63		996,138.63
Clubs and playgrounds	161,979.81		161,979.81
Post offices	1,816,306.47		1,816,306.47
Schoolhouses	126,148.52		126,148.52
Fire stations	202,661.84		202,661.84
Police stations	30,000.00		30,000.00
Courthouses	187,732.73		187,732.73
General storehouses	1,236,150.40		1,236,150.40
Other buildings and structures	297,253.65		297,253.65
Permanent town sites		1,806,513.92	1,806,513.92
Roads, streets, and sidewalks		5,061,702.73	5,061,702.73
Sewer system		727,807.64	727,807.64
Street lighting system		198,381.87	198,381.87
Plans for increasing capacity of Canal		34,600.05	34,600.05
Undistributed improvements		107,831.42	107,831.42
Interest during construction period		128,991,063.00	128,991,063.00
Total.	144,121,181.54	391,360,291.70	535,481,473.24

¹ Channels, harbors, basins, breakwaters, and municipal assets are maintained at original values from current operating expenses. Other nondepreciable property includes excavation and earth fill at locks, dams, and drydocks, and earth saddles at Madden Dam; also certain projects which were incomplete at the close of the fiscal year.

TABLE No. 7.—*Public works in cities of Panama and Colon, fiscal year 1938*

	Panama	Colon	Total
Status of capital cost to June 30, 1938:			
Construction cost:			
Waterworks and sewers.....	\$876,353.22	\$623,883.68	\$1,500,236.90
Pavements.....	592,913.23	625,619.03	1,218,532.26
Total construction cost.....	1,469,266.45	1,249,502.71	2,718,769.16
Amortization:			
Waterworks and sewers.....	517,558.90	368,310.22	885,869.12
Pavements.....	356,734.63	383,490.92	740,225.55
Total amortization.....	871,293.53	751,801.14	1,626,094.67
Capital cost reimbursable:			
Waterworks and sewers.....	358,794.32	255,573.46	614,367.78
Pavements.....	236,178.60	212,128.11	478,306.71
Capital value, June 30, 1938.....	594,972.92	497,701.57	1,092,674.49
Operating detail, fiscal year 1938:			
Operation, maintenance, and repairs:			
Waterworks and sewers.....	115,046.22	71,290.33	186,336.55
Pavements.....	17,921.58	10,091.01	28,012.59
Proportion, Zone system.....	102,131.73	38,018.75	140,153.48
Street cleaning and garbage collection.....	89,812.96	39,930.36	129,743.32
Total.....	324,915.49	159,330.45	484,245.94
Interest at 2 percent per annum:			
Waterworks and sewers.....	7,313.29	5,209.34	12,522.63
Pavements.....	4,814.02	4,935.29	9,749.31
Proportion, Zone system.....	12,577.55	5,481.05	18,058.60
Total.....	24,704.86	15,625.68	40,330.54
Amortization:			
Waterworks and sewers.....	18,511.66	13,188.22	31,702.88
Pavements.....	12,187.39	12,494.40	24,681.79
Total.....	30,702.05	25,682.62	56,384.67
Total charged to water rentals.....	380,322.40	200,638.75	580,961.15
Water rental collections in the Republic of Panama.....	380,322.40	200,638.75	580,961.15

The Panama Canal supplies water to the cities of Panama and Colon from the Canal Zone water system, and maintains the sewers and streets in the two cities under a contract entered into between the Panama Canal and the Republic of Panama in 1907. The Panama Canal collects the water rentals from the residents of these two cities and uses the funds to cover the cost of the water and maintenance of sewers and streets, interest on the unamortized investment at 2 percent per annum and amortization based on 50 years from 1907. Interest on the investment amounting to \$40,330.54, and amortization amounting to \$56,384.67 for fiscal year 1938 have been covered into the United States Treasury as miscellaneous receipts, making the totals to date \$1,605,978.17 for interest, and \$1,626,094.67 for amortization.

TABLE NO. 8.—*Receipts and disbursements, fiscal year ended June 30, 1938*

APPROPRIATED FUNDS

	Disbursing clerk, Wash- ington, D. C.	Paymaster, Canal Zone	Collector, Canal Zone	Total	United States Treasurer	Total
On hand July 1, 1937, by appropriations and funds:						
Maintenance and operation, Panama Canal	\$22,437.85	\$1,495,768.60	\$86,615.11	\$1,501,821.56	\$1,053,643.00	\$5,658,464.56
Sanitation, Canal Zone, Panama Canal	7,674.70	74,600.87	6,185.95	87,861.52	412.67	88,274.19
Civil government, Panama Canal and Canal Zone	827.95	93,525.94	3,146.74	97,500.63	21,479.86	118,980.45
Postal funds, Canal Zone (special fund)		1,277.23	50,169.89	51,447.12	74,168.43	125,615.45
Repatriation of unemployed aliens, Panama Canal		8,647.93		8,647.93	100,000.00	108,617.93
Total	380,310.50	1,673,820.57	146,117.69	1,850,278.76	4,219,703.96	6,099,982.72
Appropriations for fiscal year 1938:						
Maintenance and operation, Panama Canal					8,519,000.00	8,519,000.00
Sanitation, Canal Zone, Panama Canal					918,000.00	918,000.00
Civil government, Panama Canal and Canal Zone					1,311,760.00	1,311,760.00
Memorial to Maj. Gen. George W. Goethals					5,000.00	5,000.00
Total					10,573,760.00	10,573,760.00
Transfers between fiscal officers:						
Maintenance and operation, Panama Canal	5,400,000.00	11,129,774.87		16,520,774.87	225,014.58	16,754,789.45
Sanitation, Canal Zone, Panama Canal	115,600.00	1,515,412.73		1,630,412.73	72,019.72	1,702,462.45
Civil government, Panama Canal and Canal Zone	60,000.00	1,175,813.83		1,235,813.83	1,50	1,235,813.83
Postal funds, Canal Zone (special fund)		200,000.00		260,000.00	312,390.11	572,390.11
Memorial to Maj. Gen. George W. Goethals	4,000.00			4,000.00		4,000.00
Total	5,579,000.00	14,081,037.43		19,660,037.43	609,455.91	20,299,493.34
Collections repayable to appropriations:						
Maintenance and operation, Panama Canal	223,037.25	236,144.39	8,376,093.36	8,835,275.00	1,045.20	8,836,320.20
Sanitation, Canal Zone, Panama Canal	70,672.38		657,676.63	738,319.01	67.13	738,416.44
Civil government, Panama Canal and Canal Zone	42.70		126,139.84	126,182.54	534.35	126,716.89
Postal funds, Canal Zone (special fund)			309,242.50	309,242.50		309,242.50
Total	293,752.33	236,144.39	9,479,152.42	10,009,049.14	1,646.68	10,010,685.82
Total cash debits	5,903,192.83	15,991,002.39	9,625,270.11	31,519,365.33	15,434,566.55	46,953,931.88
Covered into the United States Treasury:						
Business net revenues, fiscal year 1937, maintenance and operation, Panama Canal						874,210.96
						874,210.96

Transfers between fiscal officers:						
Maintenance and operation, Panama Canal.						
Sanitation, Canal Zone, Panama Canal.						
Civil government, Panama Canal and Canal Zone.						
Postal funds, Canal Zone (special fund).						
Memorial to Maj. Gen. George W. Goethals.						
Total.	223,452.64		8,381,336.81	8,604,789.45	8,150,000.00	16,754,789.45
	72,049.72		665,412.73	777,462.45	1,702,492.45	
	1.50		125,548.83	125,551.33	1,235,851.33	
			312,390.11	312,390.11	572,390.11	
					4,000.00	4,000.00
Total.	295,563.86		9,484,089.48	9,780,493.34	10,489,000.00	20,269,493.34
Disbursements:						
Maintenance and operation, Panama Canal.	5,139,894.55	11,723,375.64	16,865,270.19	3,839.21	16,869,109.40	
Sanitation, Canal Zone, Panama Canal.	111,847.58	1,544,013.09	1,655,890.67	468.44	1,656,359.11	
Civil government, Panama Canal and Canal Zone.	53,358.24	1,185,797.67	1,299,355.91	57.50	1,239,413.41	
Postal funds, Canal Zone (special fund).		242,893.05	292,893.05	93,850.63	336,733.68	
Repatriation of unemployed aliens, Panama Canal.		3,279.67	3,279.67	---	3,279.67	
Memorial to Maj. Gen. George W. Goethals.	1,791.42		1,791.42	---	1,791.42	
Total.	5,307,091.79	14,701,389.12		20,008,480.91	98,215.78	29,106,696.69
On hand June 30, 1938:						
Maintenance and operation, Panama Canal.						
Sanitation, Canal Zone, Panama Canal.						
Civil government, Panama Canal and Canal Zone.						
Postal funds, Canal Zone (special fund).						
Repatriation of unemployed aliens, Panama Canal.						
Memorial to Maj. Gen. George W. Goethals.						
Total.	282,127.91	1,136,312.22	81,371.66	1,499,811.79	3,770,652.61	5,270,464.40
	8,849.78	45,970.51	8,449.85	63,270.14	25,061.08	88,331.22
	7,310.91	83,578.10	3,436.75	94,325.76	43,718.21	138,013.97
		18,384.18	47,022.37	65,406.55	32,797.91	98,114.46
		5,368.26	---	5,368.26	100,090.00	105,368.26
				2,208.58	1,000.00	3,208.58
Total.	300,497.18	1,289,613.27	140,280.63	1,730,391.08	3,973,139.81	5,703,530.89
Total cash credits.	5,903,092.83	15,991,002.39	9,625,270.11	31,519,365.33	15,431,566.55	46,953,931.88

Appropriated funds comprise the working cash for operation and development of the Panama Canal, and are derived from annual appropriations by the Congress, augmented by collections for sales and services which by law are repayable to Canal appropriations, any net revenue derived therefrom to be covered into the United States Treasury.

There are three regular appropriations for the Panama Canal covering maintenance and operation, sanitation, and civil government. In addition, postal receipts from the sale of stamps and from money order fees, which are deposited in Treasury subject to withdrawal, are reexpendable for the operation of Canal Zone post offices, but money order funds, including postal savings, are handled separately under "custodial funds" in the following table.

Occasionally special appropriations are made by the Congress for specific purposes, usually available until expended, such as for repatriation of unemployed aliens, and memorial to Maj. Gen. George W. Goethals, shown in the foregoing table.

TABLE No. 9.—*Receipts and disbursements, fiscal year ended June 30, 1938*

CUSTODIAL FUNDS

	Disbursing clerk, Wash- ington, D. C.	Paymaster, Canal Zone	Collector, Canal Zone	Total	United States Treasurer	Total
On hand July 1, 1937:						
Revenue due U. S. Treasury	\$27,000.00		\$143,920.84	\$143,920.84		\$143,920.84
Security deposits			515,301.37	515,301.37		518,031.93
Trust funds:						
Clubhouse funds			154,445.77	154,445.77		154,445.77
Money-order funds			2,481,898.02	2,481,898.02		2,481,898.02
Miscellaneous trust funds			23,419.69	23,419.69		23,419.69
Total	27,000.00		3,322,485.69	3,349,485.69	5,250.56	3,354,736.25
Receipts:						
Revenue due U. S. Treasury	2,302.70	\$4.28	23,399,935.81	23,402,242.79		23,402,242.79
Security deposits	107,239.82	5,160,074.59	29,426,866.90	34,604,201.31		34,694,201.31
Trust funds:						
Clubhouse funds			865,305.86	868,305.86		868,305.86
Money-order funds			2,851,119.85	2,851,119.85		2,851,119.85
Miscellaneous trust funds			53,525.97	53,525.97		53,525.97
Total	109,562.52	5,160,078.87	56,569,754.39	61,869,395.78		61,869,395.78
Total cash debits	136,562.52	5,160,078.87	59,922,240.08	63,218,881.47	5,250.56	65,224,132.03
Covered into the United States Treasury: Revenue due U. S. Treasury--	2,302.70	4.28	23,405,476.15	23,407,753.13		23,407,753.13
Transfers and refunds: Security deposits--	134,189.82	5,160,074.59	20,425,817.25	34,720,081.66		34,720,081.66
Disbursements:						
Trust funds:						
Clubhouse funds			852,954.65	852,954.65		852,954.65
Money-order funds			2,799,528.16	2,799,528.16		2,799,528.16
Miscellaneous trust funds			53,898.73	53,898.73		53,898.73
Total	136,492.52	5,160,078.87	56,543,474.94	61,840,046.33		61,840,046.33
On hand June 30, 1938:						
Revenue due U. S. Treasury			138,380.50	138,380.50		138,380.50
Security deposits			516,881.02	516,881.02		522,171.58
Trust funds:						
Clubhouse funds			169,796.98	169,796.98		169,796.98
Money-order funds			1,2,536,459.71	1,2,536,459.71		1,2,536,459.71
Miscellaneous trust funds			17,246.93	17,246.93		17,246.93
Total	70.00		3,378,765.14	3,378,835.14	5,250.56	3,384,085.70
Total cash credits:	136,562.52	5,160,078.87	59,922,240.08	65,218,881.47	5,250.56	65,224,132.03

¹ Includes \$1,908,092.13 invested in U. S. Treasury bonds, and \$290,262.26 in Federal farm loan bonds, total, \$2,198,354.39.

Custodial funds cover cash transactions which are controlled by separate fiscal regulations from those which govern the expenditure of appropriations made by Congress for maintenance and operation of the Panama Canal.

Revenue due United States Treasury covers collections for deposit as miscellaneous receipts of the United States Government which form no part of the working cash of the Panama Canal, as these funds must by law immediately be covered into the United States Treasury and relinquished from control of the Panama Canal. These collections consist mainly of tolls, licenses, court fees and fines, and amortization of public works in Panama and Colon.

Security deposits cover cash received by Canal fiscal officers from banks, individuals, and companies to guarantee payment of bills rendered by the Panama Canal and the Panama Railroad Co., and to guarantee fulfillment of contracts. Disbursements of these funds represent transfers to revenue due United States Treasury on this table, collections repayable to appropriations on the preceding table, and the return of unexpended balances to depositors.

Trust funds cover certain activities conducted by the Canal Zone Government separately from appropriations, principally postal money order funds, and transactions of Panama Canal clubhouses maintained exclusively for employees.

The balances of \$183,506.18 for interest, and \$4,885.86 for reserve for fluctuation in bond values, shown in the report for the fiscal year 1937, have been combined with the balance of \$2,296,505.98, money order funds, making the new balance at the beginning of this fiscal year, \$2,484,898.02.

TABLE No. 10.—*Accounts receivable*

REGISTERED DURING THE YEAR

	Fiscal year 1937	Fiscal year 1938
Repaid to appropriations:		
Panama Railroad Co.....	\$2,301,644.23	\$2,087,270.39
Other departments of the U. S. Government.....	1,496,122.49	1,529,065.72
Individuals and companies.....	3,387,552.73	3,772,977.87
Total.....	7,185,319.45	7,389,313.98
Miscellaneous receipts:		
Tolls.....	23,147,640.46	23,215,207.39
Public works, Panama.....	87,954.36	96,715.21
Total.....	23,235,594.82	23,311,922.60
Total accounts receivable registered.....	30,420,914.27	30,701,236.58
Number of bills registered.....	40,409	37,000

OUTSTANDING ACCOUNTS RECEIVABLE

Audited bills.....	\$727,098.18	\$644,936.85
Hospital certificates.....	31,013.79	31,616.20
Injury compensation.....	4,938.86	4,527.07
Unredeemed commissary coupons.....	126.43	41.58
Total.....	763,177.26	681,121.70

The outstanding balance at the end of the fiscal year includes all accounts due the Panama Canal except items of utility service, principally for employees, which are not credited to earnings until collected, usually by pay roll deductions.

TABLE NO. 11.—*Material and supplies*

	Fiscal year 1937	Fiscal year 1938
Stock on hand, first of year:		
Balboa store.....	\$2,419,286.89	\$2,627,306.50
Medical store.....	72,305.06	83,541.21
Administration building store.....	38,761.47	32,473.95
Gamboa store.....	403,042.68	392,928.31
Cristobal store.....	595,761.06	548,017.92
Locks store.....	595,030.55	582,153.97
Fuel oil plants.....	72,509.77	192,333.03
Panama Canal Press.....	66,716.97	72,833.18
Sand and gravel pile.....	155,998.23	110,272.63
Division stores.....	187,944.45	255,860.72
Total stock card value.....	4,607,447.13	4,897,721.42
Reserve for inventory adjustments.....	407,292.97	389,165.37
Book value of stock on hand.....	4,200,154.16	4,508,556.05
Receipts of material:		
Purchases for stock.....	4,705,818.34	4,726,827.09
Purchases for divisions.....	532,093.60	519,657.56
Local production.....	429,322.65	360,729.52
Service charges and adjustments.....	650,544.78	724,322.79
Book value of receipts.....	6,317,809.37	6,331,536.96
Total charges to stock.....	10,517,963.53	10,840,003.01
Issues and sales of material:		
Issues to business divisions.....	3,190,663.33	3,236,707.22
Issues to Canal divisions.....	1,519,095.01	1,311,586.46
Variation in divisions stores.....	¹ 67,916.27	48,124.27
Total issues.....	4,641,842.07	4,599,417.95
Sales.....	1,367,565.41	1,257,807.07
Total issues and sales.....	6,009,407.48	5,857,225.02
Stock on hand, end of year:		
Balboa store.....	2,627,306.50	3,126,890.74
Medical store.....	83,541.21	84,021.33
Administration building store.....	32,473.95	26,421.52
Gamboa store.....	392,928.31	440,526.08
Cristobal store.....	548,017.92	582,313.89
Locks store.....	582,153.97	555,585.09
Fuel oil plants.....	192,333.03	145,011.59
Panama Canal Press.....	72,833.18	80,498.41
Sand and gravel pile.....	110,272.63	77,660.50
Division stores.....	255,860.72	207,736.45
Total stock card value.....	4,897,721.42	5,326,728.69
Reserve for inventory adjustments.....	389,165.37	343,860.70
Book value of stock on hand.....	4,508,556.05	4,982,867.99

¹ Indicates reduction of issues and sales.

In the foregoing table values of stock on hand at the beginning and end of the year are stated at stock-card prices which cover the cost of material delivered into general storehouses, except for necessary adjustments due to price averaging of various consignments of the same article, inventory discrepancies, exchange of containers, etc.

Effective July 1, 1936, all issues and sales were surcharged to cover handling and operating costs and in the foregoing table this surcharge is included in receipts of material under "service charges," and has been added to issues and sales.

TABLE No. 12.—*Work in progress*

	Fiscal year 1937	Fiscal year 1938
Electrical division.....	\$2,898.61	\$8,337.14
Shops and dry docks.....	50,774.31	123,757.76
Building division.....	277.79	
Panama Canal Press.....	2,506.40	3,049.13
Total.....	56,457.11	135,144.03

This account covers the amounts expended on uncompleted jobs, and will ultimately be cleared to operating expenses of the divisions indicated, with corresponding credits to their revenues after application of authorized surcharge.

TABLE No. 13.—*Deferred charges*

	Fiscal year 1937	Fiscal year 1938
Clubs and playgrounds.....	\$80.67	\$93.34
Civil government.....	997.37	997.37
Health department.....	3,852.61	1,505.24
Office engineer.....		2,627.45
District quartermaster, Balboa.....		434.16
Port captain, Balboa.....	1,040.28	1,616.76
Lighthouse subdivision.....		282.55
Atlantic locks.....		74,262.38
Dredging division.....	217,016.59	203,678.77
General accounts, suspense.....		2,793.56
Electrical division.....	82.29	1,476.89
Municipal division.....	5,783.74	28,925.27
Shops and dry docks.....	26,701.90	44,268.51
Fuel oil plants.....	470.00	430.84
General storehouses.....		5,838.90
Building division.....	96,992.23	173,162.65
District quartermasters' supplies.....	3,593.43	3,091.63
Public works:		
Panama.....	16,858.87	30,913.54
Colon.....	18,441.98	5,920.22
Total.....	391,911.96	582,323.03

This account covers expenses incurred for account of divisions indicated, but which are not chargeable to operating accounts of the current year. These amounts are cleared as soon as values are consumed.

TABLE No. 14.—*Capital investment*

Appropriations for Canal construction to June 30, 1921 (detail in annual report for 1924, table No. 3).....	\$386,910,301.00
Deduct value of capital stock of the Panama Railroad Co.....	7,000,000.00
Net construction appropriations.....	379,910,301.00
Annual payments to the Republic of Panama, 1913 to 1920 (State Department).....	2,000,000.00
Additional construction funds, July 1, 1921, to June 30, 1938.....	29,792,783.73
Total cash investment.....	411,703,084.73
Interest on construction funds (compounded annually), 1904 to 1920.....	128,991,063.00
Total capital investment.....	540,694,147.73

The capital investment account covers the following assets, showing the total as of June 30, 1937, the increase for the current fiscal year, and the total as of June 30, 1938:

	June 30, 1937	Increase	June 30, 1938
Canal general property (table No. 2)-----	\$494,078,137.68	\$1,661,514.37	\$495,739,652.05
Floating plant (table No. 3)-----	8,006,425.24	1,132,804.88	7,873,620.36
Business fixed property (table No. 4)-----	27,667,767.21	856,829.07	28,554,596.28
Business equipment (table No. 5)-----	3,139,083.63	174,520.92	3,313,614.55
Public works, Republic of Panama (table No. 7)-----	1,149,059.16	1,56,384.67	1,092,674.49
Proportion of working capital (table No. 23)-----	4,120,000.00		4,120,000.00
 Total capital assets-----	538,160,472.92	2,533,674.81	540,694,147.73
Less accrued depreciation (table No. 16)-----	30,494,064.25	1,853,260.98	32,347,325.23
 Net capital investment-----	507,666,408.67	680,413.83	508,346,822.50

¹ Denotes decrease.

The capital investment at the close of the fiscal year 1938 amounted to \$540,694,147.73. The increase of \$2,533,674.81 was due to the making of necessary additions to plant and equipment as shown on capital tables Nos. 2, 3, 4, and 5.

Interest on the net capital investment from 1922 to date is considered as a charge to operating expenses, and while this charge does not appear on the balance sheet a statement of such interest compared with net revenues, by years, is shown on table No. 21. Interest for the current fiscal year is based upon the net capital investment of \$507,666,408.67, as of June 30, 1937, and amounts to \$15,229,992.24.

The total capital assets as of June 30, 1937, amounting to \$538,160,472.92, is after deductions of \$250,000.00 for payment to Republic of Panama and \$14,661,297.43 for interest during construction period incident to change in closing date of construction of Canal from 1921 to 1920, approved by the President August 17, 1937.

TABLE No. 15.—*Outstanding accounts payable*

	Fiscal year 1937	Fiscal year 1938
United States invoices-----	\$189,155.13	\$18,465.33
Isthmian vouchers-----	86,416.83	80,747.47
Current pay rolls-----	1,094,131.31	1,103,113.47
Unpaid salaries and wages-----	29,043.54	30,412.45
Drums, carboys, and reels-----	6,802.77	7,466.27
Local purchases-----	1,407.61	1,302.72
 Total-----	1,404,171.97	1,269,902.27

¹ Denotes debit.

The above table covers all current obligations of the Panama Canal, except deposits to guarantee payment of bills and trust funds, both of which are covered by table No. 9, custodial funds.

TABLE No. 16.—*Depreciation reserves, fiscal year 1938*

CANAL DEPRECIATION

	Balance July 1, 1937 (ad-justed)	Accruals	Retire-ments	Balance June 30, 1938
Locks.....	\$10,587,129.29	\$493,395.69	-----	\$11,080,524.98
Madden Dam.....	109,357.52	54,998.81	-----	164,356.33
Spillways.....	469,051.44	21,320.52	-----	490,371.96
Aids to navigation.....	436,318.54	13,969.94	-----	450,288.48
Wharves and piers.....	2,175,978.25	127,425.38	-----	2,303,403.63
Drydocks.....	689,349.61	42,226.04	-----	731,575.65
Coaling plants.....	2,884,667.40	151,824.60	-----	3,036,492.00
Dredging division plant.....	444,837.67	35,662.91	-----	480,500.58
Office buildings.....	365,872.69	24,683.01	-----	390,555.70
Gorgas Hospital.....	340,976.82	18,125.51	-----	359,102.33
Corozal Hospital.....	78,203.38	5,326.66	-----	83,530.04
Colon Hospital.....	63,363.12	4,248.61	-----	67,611.73
Dispensaries.....	46,123.83	3,301.04	-----	49,424.87
Palo Seco colony.....	42,024.80	2,515.31	\$9,106.00	35,437.11
Quarantine stations.....	61,752.96	1,819.82	-----	63,572.78
Other health department structures.....	24,848.31	1,981.59	-----	26,829.90
Clubs and playgrounds.....	293,596.51	19,113.55	18,608.43	294,101.63
Post offices.....	19,729.10	63.70	14,064.00	5,728.80
Schoolhouses.....	174,730.13	22,147.70	-----	196,877.83
Fire stations.....	28,033.40	2,673.29	-----	30,706.69
Police stations.....	16,299.20	2,980.00	699.20	18,580.00
Prisons.....	3,750.00	750.00	-----	4,500.00
Courthouses.....	78,535.50	2,617.85	-----	81,153.35
General storehouses.....	462,996.75	27,352.61	-----	490,349.36
Other buildings and structures.....	184,291.62	4,222.77	-----	188,514.39
Contingent reserve.....	127,348.02	115,250.09	2,294.80	240,303.31
Total, canal depreciation.....	20,209,165.86	1,200,000.00	44,772.43	21,364,393.43

The balance as of July 1, 1937, has been adjusted as follows:

Balance, June 30, 1937, as shown in 1937 report.....	\$20,477,523.19
Add items transferred from plant depreciation.....	53,310.00
Ferryboats.....	\$53,310.00
Deduct items transferred to plant depreciation.....	-----
Office Building No. 1907, Cristobal.....	\$7,933.33
Silver quarters.....	313,734.00
Adjusted balance, July 1, 1937.....	20,209,165.86

In addition to the above, Building No. 708, Old Balboa Police Station, was transferred to other buildings and structures with corresponding transfers of balances as of July 1, 1937, in amount of \$12,725.81.

PLANT DEPRECIATION

	Balance July 1, 1937 (adjusted)	Accruals	Retire-ments	Balance June 30, 1938
Floating plant:				
Tugs.....	\$778,275.48	\$90,960.00	\$50,416.00	\$818,819.48
Launches.....	190,496.50	25,071.56	12,000.00	203,568.36
Dredges.....	1,389,940.00	88,080.00	-----	1,478,020.00
Dump scows.....	863,132.60	58,410.00	21,700.00	899,872.60
Machine barges.....	236,935.30	28,770.00	-----	265,705.30
Lighters.....	107,958.08	7,714.00	-----	115,672.08
Total, floating plant.....	3,566,738.26	299,035.56	84,116.00	3,781,657.82
Business fixed property:				
Electric power system.....	1,585,570.08	133,920.00	13,975.79	1,705,514.29
Electric work.....	24,372.38	4,277.16	-----	28,649.54
Water system.....	765,425.95	69,780.00	18,089.86	817,116.09
Municipal work.....	4,105.93	332.00	-----	4,437.93
Shops and drydocks.....	668,243.91	60,862.12	-----	729,166.03

PLANT DEPRECIATION—Continued

	Balance July 1, 1937 (adjusted)	Accruals	Retire- ments	Balance June 30, 1938
Business fixed property—Continued.				
Fuel oil plants.....	\$672,629.24	\$79,011.12	\$18,715.00	\$712,955.36
Motor transportation.....	22,519.05	2,821.98	14,856.59	10,484.44
Motorcar repair shops.....	18,793.24	876.00	10,476.92	9,192.32
Building division.....	9,188.50	2,117.00	2,160.00	9,145.50
Gold quarters.....	1,161,582.89	156,804.00	20,949.31	1,297,437.55
Silver quarters.....	355,534.00	13,997.04	31,600.00	337,931.04
Rented buildings.....	215,876.15	12,858.21	4,811.99	233,892.37
District quartermasters' supplies.....	9,403.53	3,885.30	150.00	13,138.83
Total business fixed property.....	5,523,244.85	541,571.93	135,815.49	5,929,001.29
Business equipment:				
Electric power system.....	22,302.36	12,037.00	517.50	33,821.86
Electric work.....	4,288.57	816.00	—	5,104.57
Municipal work.....	151,581.79	26,791.56	300.00	178,073.35
Shops and drydocks.....	565,971.96	91,413.14	35,384.54	625,000.56
General storehouses.....	58,892.00	6,566.50	—	65,458.50
Motor transportation.....	271,737.41	53,349.12	93,800.63	231,255.93
Motorcar repair shops.....	16,871.56	3,000.20	—	19,871.76
Building division.....	50,730.05	4,413.90	—	55,143.95
Panama Canal Press.....	42,195.93	3,468.26	—	45,664.19
District quartermasters' supplies.....	8,359.62	2,504.40	—	10,861.02
Farm bureau.....	1,984.00	—	—	1,984.00
Total business equipment.....	1,191,915.28	207,360.08	130,002.67	1,272,272.69
Total business fixed property and equipment.....	6,718,160.13	748,932.01	265,818.16	7,201,273.98
Total plant depreciation.....	10,284,898.39	1,047,967.57	349,934.16	10,982,931.80

The balance as of July 1, 1937, has been adjusted as follows:

Balance June 30, 1937, as shown in 1937 report.....	\$10,016,541.06
Add items transferred from Canal depreciation.....	321,667.33
Building No. 1907, Cristobal:	
Electrical division.....	\$4,488.00
Municipal division.....	3,445.33
Silver quarters.....	313,734.00
	10,338,208.39
Deduct item transferred to Canal depreciation.....	53,310.00
Ferry boats.....	53,310.00
Adjusted balance, July 1, 1937.....	10,284,898.39

SUMMARY

	Balance July 1, 1937 (adjusted)	Accruals	Retire- ments	Balance July 1, 1938
Canal depreciation.....	\$20,209,165.86	\$1,200,000.00	\$44,772.43	\$21,364,393.43
Plant depreciation.....	10,284,898.39	1,047,967.57	349,934.16	10,982,931.80
Total depreciation.....	30,494,064.25	2,247,967.57	394,706.59	32,317,325.23

The accrued balance as of June 30, 1938, for Canal depreciation applies to depreciable Canal general property shown in table No. 6, amounting to \$104,379,360.35, and for plant depreciation applies to floating plant, business fixed property, and business equipment, shown in tables Nos. 3, 4, and 5, amounting to \$39,741,821.19.

TABLE No. 17.—*Reserve for repairs*

	Balance July 1, 1937 (adjusted)	Accruals	Charges	Balance June 30, 1938
Floating plant:				
Tugs and crane boats.....	\$42,391.56	\$81,600.00	\$101,633.64	\$22,357.92
Ferryboats.....	253.44	4,819.46	5,887.84	1,814.94
Launches.....	11,022.10	8,959.00	7,936.90	-----
Dredges.....	35,413.44	252,000.00	290,487.69	13,074.25
Dump scows.....	54,515.98	126,240.00	127,269.82	53,486.16
Machine barges.....	117,852.02	22,920.00	15,968.40	110,900.42
Lighters.....	6,891.63	11,280.00	11,108.16	7,063.47
Total floating plant.....	120,591.93	507,818.46	560,292.45	68,117.94
Business fixed property:				
Electric power system.....	35,236.52	-----	20,162.15	15,074.37
Electric work.....	6,027.41	3,371.52	3,434.27	5,964.66
Shops and drydocks.....	41,250.34	30,829.31	44,502.81	36,576.84
Wharves and piers.....	138,986.48	75,000.00	42,902.21	171,084.27
General storehouses.....	49,313.50	12,000.00	43,380.05	17,933.45
Panama Canal Press.....	3,348.91	1,500.00	1,314.55	3,534.36
Total business fixed property.....	274,163.16	131,700.83	155,696.04	250,167.95
Business equipment:				
Electric work.....	34,817.43	32,031.06	34,764.53	32,083.96
Shops and drydocks.....	100,562.24	96,073.97	91,102.98	105,533.23
Motor transportation.....	12,307.85	90,285.39	83,611.05	18,982.19
Sand and gravel.....	3,492.07	2,628.60	5,682.51	438.16
Total business equipment.....	151,179.50	221,019.02	215,161.07	157,037.54
Total business fixed property and equipment.....	425,342.75	352,719.85	370,857.11	407,205.49
Total reserve for repairs.....	545,934.68	860,538.31	931,149.56	475,323.43

¹ Denotes debit.

As of February 28, 1938, the reserve for repairs on launches, shown under floating plant, was discontinued and the balance of \$22,286.53 was transferred to tugs and crane boats.

TABLE No. 18.—*Reserve for leave*

	Fiscal year 1937	Fiscal year 1938
Electrical division.....	\$123,937.31	\$124,488.13
Municipal division.....	58,079.72	62,510.44
Shops and drydocks.....	197,806.40	173,628.13
Motor transportation.....	16,519.16	14,857.61
Motorcar repair shops.....	20,675.51	16,399.11
Building division.....	35,845.63	33,653.85
Fortifications division.....	5,607.29	-----
Total.....	458,471.02	425,537.27

The foregoing table represents the reserve for vacation pay due employees of the principal business divisions. This reserve is created by adding a percentage to direct labor charges for work performed by the division listed above to the credit of this account. The account is debited with the amount paid to employees when leave is actually taken.

TABLE No. 19.—*Deferred credits*

	Fiscal year 1937	Fiscal year 1938
Executive offices	\$5,979.88	\$1,852.27
Comptroller's office	1,695.00	3,075.48
Civil government	15,727.14	22,106.81
Postal service	65,685.13	38,057.70
Health department	4,933.95	5,882.07
Office engineer	20,748.70	11,232.47
Surveys	2,168.77	954.13
District quartermaster:		
Pedro Miguel	404.12	361.94
Gamboa		147.06
Cristobal	306.52	
Lighthouse subdivision	2,860.00	
Pacific locks	2,293.75	6,396.95
Atlantic locks	30,353.25	1,493.25
General accounts, suspense	1,242.50	595.99
Municipal division	83,078.24	57,358.16
Shops and drydecks	31,237.58	34,748.18
General storehouses	3,753.30	4,706.49
Building division	18,542.68	10,535.85
Panama Canal Press	1,744.25	1,671.90
Gold quarters	4,052.50	
District quartermasters' supplies	127.41	586.28
Farm bureau	8,283.27	4,678.19
Nautical charts and publications	992.32	1,092.33
Contingencies:		
Maintenance and operation	45,424.71	45,410.43
Sanitation	743.42	743.42
Civil government	148.07	148.07
Total	352,526.46	253,835.42

This account covers expenses accrued or estimated which have been charged to operating accounts, but for which it was impracticable to institute corresponding payments at the close of the accounting period. These amounts are cleared as soon as corresponding charges are passed for payment, or contingent expenses arise.

TABLE No. 20.—*Consolidated statement of income, expenses, and net revenues*

	Fiscal year 1937	Fiscal year 1938
Canal operations:		
Canal revenues:		
Tolls	\$23,147,433.54	\$23,215,192.39
Postal surplus	6,369.45	
Other miscellaneous receipts	92,406.29	90,335.19
Total Canal revenues (table No. 24)	23,216,299.28	23,305,527.58
Canal earnings (table No. 25)	3,180,584.29	3,252,970.16
Total revenues	26,426,793.57	26,558,497.74
Canal expenses:		
Executive department	480,964.93	489,508.72
Clubs and playgrounds	93,000.00	83,000.00
Accounting department	511,629.33	552,360.23
Washington office	262,227.29	268,814.04
Civil government	1,190,578.58	1,254,568.83
Postal service	319,674.14	317,042.99
Health department	1,670,967.75	1,694,854.20
Office engineer	258,182.35	187,114.52
Special engineering section		46,355.73
Section of surveys	91,212.69	115,573.44
Public buildings and grounds	387,732.85	375,021.17
Marine division	1,543,471.68	1,547,440.46
Locks operation and maintenance	1,412,223.55	1,507,218.47
Locks overhaul	749,575.00	
Dams and spillway	77,685.73	67,896.55
Dredging division	2,235,344.87	2,189,014.00
Municipal expenses	321,274.08	239,207.55
Railroad tracks maintenance	23,723.23	22,337.63
Recruiting and repatriating employees	25,588.65	14,851.92

TABLE No. 20.—*Consolidated statement of income, expenses, and net revenues—Con.*

	Fiscal year 1937	Fiscal year 1938
Canal operations—Continued.		
Canal expenses—Continued.		
Transportation of employees on Isthmus.....	\$107,574.96	\$125,353.60
Damage to vessels.....	3,148.10	17,520.93
Miscellaneous general expense.....	44,137.58	23,179.50
Depreciation on general property.....	1,200,000.00	1,200,000.00
Annual payment to Republic of Panama.....	250,000.00	250,000.00
Total Canal expenses.....	13,299,208.34	12,648,594.48
Net Canal revenues (table No. 25).....	13,136,555.23	13,909,903.26
Fixed capital charge.....	14,440,256.12	14,463,613.43
Surplus (or deficit).....	11,303,670.89	¹ 553,710.17
Business operations:		
Business revenues.....	18,437,718.24	17,940,845.32
Business expenses.....	17,520,358.10	17,116,232.72
Net business revenues (table No. 26).....	917,360.14	824,612.60
Fixed capital charge.....	765,141.18	766,378.81
Surplus (or deficit).....	152,218.96	58,233.79
Combined operations:		
Revenues.....	44,864,511.81	44,499,343.06
Expenses.....	30,810,566.44	29,764,827.20
Net revenues.....	14,053,945.37	14,734,515.86
Fixed capital charge at 3 percent.....	15,205,397.30	15,229,932.24
Surplus (or deficit).....	¹ 1,151,451.93	¹ 495,476.38
Capital investment (table No. 14).....	506,846,576.60	507,666,408.67
Combined net revenues.....	14,053,945.37	14,734,515.86
Percent of capital return.....	2.77	2.90

¹ Denotes deficit.

A summary comparison of net revenues and capital interest, by years, from 1921 to date, is shown on table No. 21, following, together with a brief description of accounting policy governing charges to operating expenses.

TABLE No. 21.—*Revenues, expenses, and computed surplus*

Fiscal year	Tolls	Civil revenues	Business profits	Total revenues	Net appropriations ¹	Net revenues	Capital interest 3 percent ²	Computed surplus ³
1914-20								
1921	\$33,303,581.67	\$1,206,579.86	\$536,098.34	\$35,046,259.87	\$36,657,766.89	\$3,511,611,507.02	\$14,674,961.74	\$1,611,507.02
1922	213,986.19	564,211.20	12,010,116.70	9,578,306.14	2,461,816.56	3,238,833.86	15,253,780.02	3,121,213,148.18
1923	332,447	233,259.16	11,708,831.48	8,469,017.63	10,591,709.00	16,202,130.18	3,238,833.86	3,121,013,946.17
1924	507,630.52	184,213.54	1,140,612.50	8,832,486.56	8,210,777.56	8,923,905.39	15,150,900.33	3,120,721.18
1925	289,663.16	392,250.73	901,624.12	22,348,535.01	8,666,183.44	16,639,572.62	1,568,672.29	1,568,672.29
1926	374,664.12	207,934.04	765,916.85	23,086,446.82	8,513,408.47	15,442,978.35	15,085,480.49	3,114,417,888.92
1927	325,456.03	215,680.50	844,310.29	25,488,345.62	9,547,715.00	15,937,630.60	15,085,480.49	3,577,397.71
1928	217,185.32	391,623.50	876,536.80	27,719,735.12	9,501,200.82	18,411,564.29	15,085,029.29	869,019.81
1929	943,513.11	232,532.57	243,391.39	737,850.26	10,187,150.71	17,917,625.27	15,035,029.29	3,376,535.00
1930	123,534.33	349,295.35	207,117.36	28,187,314.27	9,893,920.93	18,293,423.44	14,987,321.89	2,904,210.72
1931	644,530.39	345,630.35	562,794.17	25,653,314.91	10,693,353.53	14,859,991.38	14,986,578.04	3,305,805.55
1932	705,568.49	327,444.23	557,095.44	21,591,108.16	10,239,211.84	11,351,896.32	14,913,807.66	3,390,911.34
1933	621,158.61	310,014.16	1,335,708.62	21,063,881.39	9,555,672.02	11,511,269.37	14,905,732.16	3,396,592.79
1934	665,616	90,666.67	1,366,755.12	15,328,486.95	7,751,383.77	17,777,103.18	15,039,203.81	2,737,809.37
1935	338,977.90	81,957.68	1,021,216.61	24,442,152.19	9,301,429.57	15,140,722.62	15,121,193.39	16,539,233.27
1936	506,806.46	119,915.21	920,185.23	24,546,906.90	9,495,667.13	15,051,839.77	15,159,897.04	3,107,757.27
1937	147,433.54	98,775.74	917,310.14	24,163,569.42	10,109,624.05	14,053,945.37	15,205,397.30	3,115,451.93
1938	215,192.39	90,335.19	824,612.60	24,130,140.18	9,395,624.32	14,734,515.86	15,259,392.24	3,495,476.38
Total	429,465,341.34	5,302,815.75	15,490,888.54	450,258,995.63	204,751,283.23	215,507,712.40	271,198,400.56	3,25,660,688.16

¹ After deduction of Canal earnings repaid to appropriations.² Interest prior to July 12, 1920, is included in capital investment account.³ Deficits.

The above table summarizes by classes the revenues received by the Panama Canal by fiscal years from 1921 and shows the net results from operations after deducting therefrom the net current expenses chargeable to appropriations and the current interest charge on the capital investment. The interest rate of 3 percent has been used in making computations a great many years. The use of this rate received the approval of two organizations which investigated Panama Canal matters and was formally adopted when the present accounting system was established in 1932. It has been considered a fair and reasonable rate, as the Government at various times has paid much higher rates for the use of money.

Interest chargeable to operations is not included on the balance sheet and no interest charge against the Canal is actually made by the United States Treasury.

The Committee on Panama Canal Tolls and Vessel Measurement Rules, authorized by Congress, recommended that the date of completion of the Canal for the purpose of terminating interest charges to construction costs conform to the President's proclamation declaring the Canal formally opened for commercial traffic on July 12, 1920. Construction interest had previously been calculated to June 30, 1921. The Committee also recommended that operating returns be computed on the net investment in Canal property, that is, the gross cost of the Canal less accrued depreciation, instead of on the undepreciated investment used formerly. These recommendations were approved by the President on August 17, 1937.

The above changes reduced capital interest from \$143,652,360.43 to \$128,991,063.00, a difference of \$14,661,297.43, which amount, after minor adjustments, was added to operating expenses for 1921. Capital cost was also reduced by the annual payment to Panama of \$250,000 for the fiscal year 1921, with a corresponding charge to operations. Reduction of annual interest chargeable to operating expenses for each year subsequent to 1921, due to the reduced capitalization and to the deduction of depreciation therefrom, is reflected in the foregoing table, as compared with the corresponding charges shown in the tables for previous years.

Total revenues on the foregoing statement represent receipts which must be covered into the United States Treasury and relinquished from control of the Panama Canal. Earnings repayable to Canal appropriations, and reexpendable by the Canal, are deducted from gross operating expenditures, in order to present a comparison of funds covered into the Treasury with funds chargeable to operating account, exclusive of capital additions.

The absence of tax charges is compensated for by the inclusion in Canal operating accounts of the direct costs of civil government, health and welfare activities. Neither capital nor operating expenses

of the Panama Canal include the cost of the military and naval establishments on the Isthmus; however, all important exchanges of services with these interests are covered by cash settlements, or reciprocal allowances.

By including in the accounts all revenues properly applicable to Canal activities and by charging against the total revenue the net appropriation expenses including charges for depreciation and interest at 3 percent on the capital invested, but excluding any charge to amortize the investment, there has accumulated as of June 30, 1938, as shown by the foregoing table, a deficit of \$25,660,688.16.

TABLE NO. 22.—*Capital refunds*

Balance June 30, 1937.....	\$256,184,358.98
Cash covered into United States Treasury.....	24,281,994.09
Business profits (table No. 8).....	\$74,210.96
Revenue due United States Treasury (table No. 9).....	23,407,783.13
Total.....	280,466,353.07
Appropriations, fiscal year 1938 (detail below).....	10,823,760.00
Less:	
Net capital additions, current year (table No. 14).....	2,533,674.81
Net appropriation for operating account.....	8,290,085.19
Net capital refunds, June 30, 1938.....	272,176,267.88

SCHEDULE OF OPERATING APPROPRIATIONS¹

Fiscal year	Mainten- ance and operation	Sanitation	Civil Gov- ernment	Misellane- ous	Annual payment to Panama	Total
1914-24.....	\$59,018,907	\$6,800,000	\$7,125,670	³ \$151,344.55	\$1,000,000	\$74,096,921.55
1925.....	5,851,210	586,266	991,670		250,000	7,679,146.00
1926.....	7,140,000	653,216	942,150		250,000	8,985,366.00
1927.....	5,986,094	670,000	999,980		250,000	7,906,074.00
1928.....	5,830,000	670,000	1,100,000		250,000	7,850,000.00
1929.....	6,832,000	722,000	1,172,400		250,000	8,976,400.00
1930.....	8,000,000	820,000	1,201,000		250,000	10,271,000.00
1931.....	10,162,470	753,900	1,295,190		250,000	12,461,560.00
1932.....	9,359,808	782,189	1,351,089		250,000	11,743,686.00
1933.....	11,891,011	755,650	1,300,000		250,000	14,196,661.00
1934.....	11,172,700	698,426	1,235,278	⁴ 1,150,000.00	250,000	14,506,404.00
1935.....	4,971,490	768,501	792,935		250,000	6,782,926.00
1936.....	6,900,000	871,616	1,022,981		250,000	9,047,597.00
1937.....	9,119,201	899,793	1,073,950		250,000	11,372,944.00
1938.....	8,519,000	768,000	1,131,760	⁵ 5,000.00	250,000	10,823,760.00
Total.....	170,783,891	17,372,557	22,737,653	1,306,344.55	4,500,000	216,700,445.55
Less: Net capital additions, 1922 to 1938 (table No. 14).....						29,792,783.73
Net appropriation for Canal maintenance and operation.....						186,907,661.82

¹ After deduction of \$250,000 incident to change in closing date of construction of Canal from 1921 to 1920.² Operating appropriations include authorization for capital construction.³ Appropriations for increase in compensation.⁴ N. R. A., \$1,000,000; repatriation of unemployed aliens, \$150,000.⁵ Appropriation for memorial to Maj. Gen. George W. Goethals.⁶ Covers payments to Panama 1920-1924. Payments from 1913 to 1920 charged to cost of construction, \$2,000,000.

The total deposits covered into the United States Treasury from the beginning of Canal construction, with minor adjustments to reconcile changes in accounting process, amount to \$459,083,929.70, and deducting therefrom net appropriations for operation amounting to \$186,907,661.82 as shown above, produces the net capital refundment balance of \$272,176,267.88. Deposits covered into the Treas-

ury consist principally of the earned revenues cited in table No. 21, which total \$450,258,995.63, the balance being made up of sales of property, principally during the construction period, and return of appropriation balances.

Although above table shows a net cash refundment of \$272,176,267.88, such refundment is not deductible from net capital investment as shown in table No. 14, which is considered as measuring the value of the Panama Canal as an instrument of public utility upon which a perpetual return should be earned; furthermore, annual interest on net asset valuation chargeable to operating account is not included in cash transactions with the United States Treasury. Such interest at 3 percent from 1921 to 1938 would have amounted to \$271,168,400.56 as shown in table No. 21, and would have extinguished all capital refundments to date, if such interest charges had been assessed against Canal revenues.

TABLE No. 23.—*Balance of revenues and refundments*

DEBITS	
Revenue due U. S. Treasury (table No. 9).....	\$138,380.50
Appropriated cash in U. S. Treasury (table No. 8).....	3,973,139.81
Appropriated cash with fiscal officers (table No. 8).....	1,730,391.08
Accounts receivable (table No. 10).....	681,121.70
Stores (table No. 11).....	4,982,867.99
Work in progress (table No. 12).....	135,144.03
Deferred charges (table No. 13).....	582,323.03
Total debits.....	12,223,368.14

CREDITS	
Accounts payable (table No. 15).....	1,269,902.27
Reserve for repairs (table No. 17).....	475,323.43
Reserve for leave (table No. 18).....	425,537.27
Deferred credits (table No. 19).....	253,835.42
Total credits.....	2,424,598.39

Net current accounts.....	9,798,769.75
Less proportion under capital investment (table No. 14).....	4,120,000.00
Balance.....	5,678,769.75

A revolving fund now fixed at \$4,120,000, is set up in Canal accounting for working capital, and is credited to capital investment account in addition to funds used for construction and equipment, the total constituting the base for capital interest computations. Net working capital in excess of the revolving fund is considered as a temporary advance of Treasury funds, but is usually less than appropriated funds not withdrawn from the Treasury. Working capital investments are in constant process of accrual and liquidation for account of the United States Treasury.

TABLE No. 24.—*Canal revenues*

	Fiscal year 1937	Fiscal year 1938
Tolls.....	\$23,147,433.54	\$23,215,192.39
Postal surplus.....	6,369.15	-----
Licenses, fees, fines, etc.....	90,551.07	\$7,953.36
Miscellaneous.....	1,822.22	2,371.83
Total.....	23,246,209.28	23,305,527.58

Canal revenues shown above comprise earnings which by law must be covered into the United States Treasury as miscellaneous receipts, United States revenues, and relinquished from control of the Panama Canal, as distinguished from earnings repayable to Canal appropriations shown in tables 25 and 26.

Owing to a change in the law made effective at the beginning of the fiscal year 1934 the appropriation for postal expenses was discontinued, and postal receipts have been applied to defray such expenses, instead of being covered directly into the United States Treasury, as formerly, and only the surplus of postal receipts over postal expenses is for account of United States revenues.

TABLE No. 25.—*Canal earnings, expenses, and net revenues*

	Expenses	Earnings	Net expenses
Executive department:			
Executive offices.....	\$489,508.72	\$178,466.72	\$311,042.00
Clubs and playgrounds.....	83,000.00	-----	\$3,000.00
Total.....	572,508.72	178,466.72	394,042.00
Accounting department:			
Comptroller's office.....	454,509.68	293,572.68	160,937.00
Paymaster's office.....	46,132.55	26,460.00	19,672.55
Collector's office.....	51,718.00	33,863.61	17,854.39
Total.....	552,360.23	353,896.29	198,463.94
Washington office.....	268,814.04	48,600.00	220,214.04
Civil government:			
Civil affairs.....	19,455.07	-----	19,455.07
Customs.....	31,448.90	337.50	31,111.40
Division of schools.....	514,293.71	59,047.25	455,216.46
Fire protection.....	143,954.15	153.85	143,800.30
Police and prisons.....	521,720.86	68,570.23	453,150.63
Magistrates' courts.....	18,618.28	-----	18,618.28
District court.....	5,377.86	-----	5,377.86
Total.....	1,254,868.83	128,108.83	1,126,760.00
Postal service.....	317,042.99	317,042.99	-----
Health department:			
Chief health office.....	43,213.77	202.00	43,011.77
Gorgas Hospital.....	758,500.22	381,359.67	377,141.15
Colon Hospital.....	169,520.11	96,981.05	72,539.06
Corozal Hospital.....	105,432.00	21,493.13	83,958.87
Palo Seco colony.....	47,232.07	26,072.25	21,159.82
Line dispensaries.....	99,860.88	33,571.40	65,286.48
Quarantine service.....	78,083.25	26,267.93	51,815.32
Sanitation:			
Panama.....	34,460.06	2,006.49	32,453.57
Colon.....	21,287.96	2,824.18	18,463.78
Zone.....	164,242.61	56,360.38	107,882.23
Street cleaning and garbage collection, Panama.....	119,750.61	89,812.96	29,937.65
Street cleaning and garbage collection, Colon.....	53,240.66	39,930.36	13,310.30
Total.....	1,694,854.20	776,854.20	918,000.00

TABLE No. 25.—*Canal earnings, expenses, and net revenues*—Continued

	Expenses	Earnings	Net expenses
Technical divisions:			
Office engineer.....	\$187,114.52	\$153,292.19	\$33,822.33
Special engineering section.....	46,385.73	46,385.73	
Surveys.....	115,573.44	54,328.44	61,245.00
Total.....	349,073.69	254,006.36	95,067.33
Public buildings and grounds:			
Chief quartermaster's office.....	46,765.13	35,580.00	11,185.13
District quartermaster:			
Balboa.....	174,020.46	46,716.40	127,304.06
Pedro Miguel.....	44,357.74	30,600.08	13,757.66
Gamboa.....	10,627.79	5,725.22	4,902.57
Gatun.....	20,084.56	11,510.71	8,573.85
Cristobal.....	79,165.49	29,242.31	49,923.18
Total.....	375,021.17	159,374.72	215,646.45
Marine division:			
Marine superintendent.....	25,948.90	1,659.90	24,289.00
Port captain, Balboa:			
General.....	119,912.69	6,805.54	113,137.15
Admeasurement of vessels.....	31,551.24	80.00	31,471.24
Pilotage.....	167,003.99	83,823.60	83,180.39
Handling lines.....	119,908.06	124,080.00	14,171.94
Tugs.....	133,107.27	90,096.87	43,010.40
Launches.....	76,697.06	76,591.50	105.56
Port captain, Cristobal:			
General.....	61,199.98	1,326.00	59,873.98
Admeasurement of vessels.....	35,631.57	185.00	35,446.87
Pilotage.....	193,024.31	214,035.00	1,21,010.69
Handling lines.....	135,565.40	141,924.00	1,6,358.60
Tugs.....	140,329.89	133,908.16	6,421.73
Launches.....	67,653.11	67,731.50	178.39
Aids to navigation.....	239,876.69	55,104.35	184,772.34
Total.....	1,547,440.46	997,351.42	550,089.04
Locks operation and maintenance:			
Pacific locks:			
Miraflores Locks.....	551,223.53		551,223.53
Pedro Miguel Locks.....	420,642.33		420,642.33
Total.....	971,865.86		971,865.86
Atlantic locks:			
Gatun Locks.....	595,352.61		595,352.61
Total.....	1,567,218.47		1,567,218.47
Dams and spillways:			
Gatun Dam.....	31,615.87		31,615.87
Gatun Spillway.....	4,467.04		4,467.04
Madden Dam.....	31,813.64		31,813.64
Total.....	67,896.55		67,896.55
Dredging division:			
Atlantic entrance.....	2,079.69		2,079.69
Gatun Lake.....	79,959.05		79,959.05
Gaillard Cut.....	1,324,558.99		1,324,558.99
Miraflores Lake.....	165,007.85		165,007.85
Pacific entrance.....	184,557.37		184,557.37
Cristobal Harbor.....	112,859.80		112,859.80
Balboa Harbor.....	177,008.95		177,008.95
Removal of floating obstructions.....	34,338.71		34,338.71
Maintenance of floating cranes.....	51,308.42		51,308.42
Dredging division work.....	57,335.17	39,268.63	18,066.54
Total.....	2,180,014.00	39,268.63	2,149,745.37
Municipal expenses:			
Street lighting.....	18,884.51		18,884.51
Water for municipal purposes.....	23,400.00		23,400.00
Roads, streets and sidewalks.....	94,908.69		94,908.69
Sewer system.....	10,091.31		10,091.31
Thatcher ferry.....	91,923.04		91,923.04
Total.....	239,207.55		239,207.55

¹ Denotes credit balance.

TABLE No. 25.—*Canal earnings, expenses, and net revenues*—Continued

	Expenses	Earnings	Net expenses
Miscellaneous general expenses:			
Railroad tracks maintenance.....	\$22,337.63		\$22,337.63
Recruiting and repatriating employees.....	11,550.84		11,550.84
Repatriating alien ex-employees.....	3,301.08		3,301.08
Transportation on the Isthmus.....	125,383.60		125,383.60
Damage to vessels.....	17,520.93		17,520.93
Canal Zone experimental gardens.....	10,000.00		10,000.00
Depreciation on general property.....	1,200,000.00		1,200,000.00
Annual payment to the Republic of Panama.....	250,000.00		250,000.00
Settlement of agricultural leases.....	13,162.00		13,162.00
Cash relief to alien ex-employees.....	17.50		17.50
Net canal expenses.....	12,648,594.48	\$3,252,970.16	9,395,624.32

SUMMARY

Canal revenues (table No. 24).....	\$23,305,527.58
Net Canal expenses.....	9,395,624.32
Net Canal revenues.....	13,909,903.26

The earnings of the divisions engaged in the transiting of vessels through the Canal, as well as earnings of sanitation and civil government divisions, are deducted from gross expenses to arrive at the net expenditure from Canal appropriations, which in turn is deducted from Canal revenues to arrive at net Canal revenues, exclusive of business division profits.

Earnings of the executive offices and accounting department represent principally a proportional charge against business divisions of the Panama Canal and the Panama Railroad Co. Business divisions are reimbursed for this proportional expense by adding a surcharge to the direct cost on all work performed. The Panama Railroad's proportion is distributed to the various units of that organization.

The expense of \$83,000 shown for the clubs and playgrounds was the expense of operation and maintenance of the playgrounds subdivision of this bureau. The clubhouse subdivision is supported from the revenue derived from its business activities.

The earnings of the Washington office include \$48,600.00 charged against business storehouse operations to cover a proportional part of the cost of purchasing, inspection, and handling of material used by business divisions or sold to outside interests, which expense is covered through surcharges added to the price of material.

TABLE No. 26.—*Business expenses, revenues, and profit or loss*

Division	Expenses	Revenues	Profit or loss
Electric light and power system	\$579,975.21	\$894,308.17	\$314,332.96
Electric work	482,442.95	491,557.68	9,114.73
Telephone, telegraph, and signal work	171,252.26	171,252.26	
Water system	485,031.38	537,306.44	52,275.06
Municipal work	1,559,869.70	1,574,116.20	14,216.50
Shops and drydocks	3,053,731.51	3,155,922.04	102,190.53
Wharves and piers	75,000.00	75,000.00	
Fuel oil plants	593,305.45	621,614.32	28,308.87
General storehouses:			
Regular operations	5,264,415.05	5,334,904.86	70,489.81
Sale of Government property	59,834.33	160,767.87	100,933.54
Motor transportation	372,243.62	393,743.23	21,499.61
Motorcar repair shops	175,212.55	178,184.50	2,971.95
Building division	2,181,977.15	2,193,900.09	11,922.94
Panama Canal Press	220,598.17	228,717.93	8,119.76
Gold quarters	561,875.27	562,416.31	541.04
Silver quarters	294,305.44	294,651.25	345.81
Kented buildings	36,500.37	70,278.44	33,778.07
District quartermasters' supplies	303,353.44	308,550.75	5,197.31
Farm bureau	22,071.94	22,071.94	
Nautical charts and publications	1,471.04	2,580.70	1,109.66
Sand and gravel operations	69,063.29	75,967.20	6,903.91
Fortifications division	12,071.99	12,071.99	
Public works, Panama	355,617.54	380,322.40	24,704.86
Public works, Colon	185,013.07	200,638.75	15,625.68
Total	17,116,232.72	17,940,845.32	824,612.60

The profit on business operations as above, amounting to \$824,612.60 compares with profits in 1937 of \$917,360.14.

Profits on public works, Panama and Colon, amounting to \$40,330.54, represent interest which has been currently reported for coverage into general funds of the United States Treasury. The balance of the total profits, amounting to \$784,282.06, will be immediately covered into the Treasury as miscellaneous receipts, United States revenues, in accordance with regulations.

Business operations of the Panama Canal are conducted separately from operating activities pertaining directly to the transiting of vessels, and government of the Canal Zone. The annual appropriation acts for the Panama Canal authorize the use of appropriated funds for the conduct of auxiliary business activities, provided that funds so advanced are recovered through earnings, and with further proviso that any net profit derived from such business activities be covered annually into the United States Treasury.

TABLE No. 27.—*Balances in appropriation and fund-accounting ledger, June 30, 1938*

Assets	U. S. Treasury appropriations	Cash on hand	Accounts receivable	Transfers available	Work in progress and suspense	Storagehouse stock	Total
Maintenance and operation, Panama Canal	\$3,770,652.61	\$1,499,811.79	\$57,546.65	\$87,284.66	\$526,272.68	\$4,880,832.93	\$11,312,401.32
Sanitation, Canal Zone, Panama Canal	25,061.08	63,270.14	93,256.65	-----	91,611.38	273,198.65	-----
Civil government, Panama Canal and Canal Zone	43,718.21	94,325.76	4,763.00	-----	10,423.68	153,236.65	-----
Postal funds, Canal Zone, (special fund)	32,707.91	65,406.55	5,530.00	-----	-----	103,664.46	-----
Repatriation of unemployed aliens, Panama Canal	100,000.00	5,368.26	-----	-----	-----	105,368.26	-----
Memorial to Maj. Gen. George W. Goethals	1,000.00	2,208.58	-----	-----	1,791.42	-----	5,000.00
Miscellaneous receipts, United States revenues	138,380.30	-----	-----	784,282.06	-----	-----	922,662.56
Total	3,973,139.81	1,868,771.58	681,121.70	871,566.72	528,064.10	4,982,867.99	12,905,531.90
Liabilities	Working capital allotment	Accounts payable	Transfers payable	Special liabilities	Funded reserves	Balance	Total
Maintenance and operation, Panama Canal	\$1,010,000.00	\$1,045,289.54	\$784,292.06	\$3,779,196.28	\$1,723,633.44	\$11,342,401.32	-----
Sanitation, Canal Zone, Panama Canal	100,000.00	120,315.24	47,766.16	-----	-----	273,198.65	-----
Civil government, Panama Canal and Canal Zone	10,000.00	88,525.37	28,453.77	-----	-----	153,236.65	-----
Postal funds, Canal Zone, (special fund)	-----	15,712.12	10,932.15	21,257.51	-----	38,942.49	-----
Repatriation of unemployed aliens, Panama Canal	-----	60.00	112.58	38,057.70	-----	105,368.26	-----
Memorial to Maj. Gen. George W. Goethals	-----	-----	-----	-----	-----	5,000.00	-----
Miscellaneous receipts, United States revenues	-----	922,662.56	-----	-----	-----	922,662.56	-----
Total	4,120,000.00	2,192,564.83	871,566.72	64,432.46	3,779,196.28	1,877,771.61	12,905,531.90

This table shows the status of Panama Canal working capital by the various appropriations and funds by which it is separately accountable under existing laws and treasury regulations.

A revolving fund of \$4,120,000 is set aside in Canal accounting to cover the net investment in current accounts, which sum is included in the capital investment account (table No. 14).

The following table shows the detail of the funded reserves stated in the foregoing table as \$3,779,196.28.

TABLE No. 27A.—*Funded reserves, fiscal year 1938*

	Balance July 1, 1937 (adjusted)	Accruals	Expendi- tures	Balance June 30, 1938
Marine division:				
Tugs and crane boats.....	\$169,651.28	\$29,640.00	.....	\$199,291.28
Launches.....	93,855.11	17,570.47	.....	83,343.32
Launch <i>Kingbird</i> , addition.....			\$3,233.43	.....
Launch <i>Shearwater</i> , construction.....			16,915.40	.....
Launch <i>Jessop</i> , addition.....			790.28	.....
Launch <i>Guichiche</i> , purchase.....			7,143.15	.....
Machine barges.....	10,655.26	420.00	.....	11,073.26
Total.....	274,159.65	47,630.47	28,082.26	293,707.86
Dredging division:				
Tugs and crane boats.....	92,465.93	61,320.00	.....	40,072.11
Tug <i>Gatun</i> , construction.....			113,713.82	.....
Ferryboats.....	10,680.00	.....	.....	10,680.00
Launches.....	11,741.08	7,501.09	.....	5,576.33
Launch <i>Bass</i> , construction.....			13,665.84	.....
Dredges.....	88,080.00	88,080.00	.....	176,160.00
Dump scows.....	219,459.55	58,440.00	.....	253,072.45
No. 141, alterations.....			24,827.10	.....
Machine barges.....	179,816.72	28,350.00	.....	208,166.72
Lighters.....	86,529.25	7,714.00	.....	73,548.53
Oil barge No. 95, construction.....			20,694.72	.....
Total.....	688,772.53	251,405.09	172,901.48	767,276.14
Total, transit divisions.....	962,932.18	299,035.56	200,983.74	1,060,984.00
Electric power system:				
Hydroelectric plant, Gatun.....	100,652.85	32,520.00	5,990.90	127,181.95
Diesel electric plant, Miraflores.....	22,914.22	27,840.00	.....	50,754.22
Substations.....	156,182.84	20,040.00	.....	185,222.84
Transmission system.....	35,454.46	23,520.00	.....	58,974.46
Distribution system.....	45,508.91	21,000.00	.....	45,508.91
Madden Dam system.....	29,324.64	.....	.....	50,324.64
Electric ranges and water heaters.....	22,302.36	12,037.00	.....	34,339.36
Total.....	412,340.28	145,957.00	5,990.90	552,306.38
Electric work:				
Fixed property.....	19,884.38	4,277.16	.....	24,161.54
Equipment.....	2,904.85	816.00	.....	3,720.85
Total.....	22,789.23	5,093.16	.....	27,882.39
Water system:				
Pump station buildings.....	16,288.53	3,384.00	.....	19,672.53
Pump station machinery.....	35,618.39	7,344.00	.....	42,962.39
Filter plant buildings.....	76,325.59	16,872.00	18,089.86	75,107.73
Filter plant machinery.....	35,842.33	6,348.00	8,299.59	33,890.74
Reservoirs and tanks.....	32,650.27	7,440.00	.....	40,090.27
Pipe lines—large mains.....	99,163.12	16,872.00	.....	116,035.12
Pipe lines—distribution.....	66,935.91	11,520.00	.....	78,455.91
Total.....	362,824.14	69,780.00	26,389.45	406,214.69
Municipal work:				
Fixed property.....	660.60	332.00	.....	992.60
Equipment.....	31,202.11	26,791.56	16,354.72	41,638.95
Total.....	31,862.71	27,123.56	16,354.72	42,631.55

TABLE No. 27A.—*Funded reserves, fiscal year 1938—Continued*

	Balance July 1, 1937 (adjusted)	Accruals	Expendi- tures	Balance June 30, 1938
Mechanical division:				
Balboa shops	\$50,334.05	\$41,420.85	\$41,626.29	\$50,128.61
Rigger shop (part)				
Balboa railroad shops	10,559.90	6,094.39		16,654.29
Cristobal shops	4,200.05	13,346.88		17,546.93
Equipment, Balboa	89,020.69	62,127.77	64,124.91	87,023.55
Equipment, Cristobal	101,490.46	30,050.03	50,540.61	80,999.88
Total	255,605.15	153,039.92	156,291.81	252,353.26
Fuel oil plants:				
Balboa:				
Pumping plant	18,411.01	3,885.60		22,296.61
Storage tanks	36,442.80	8,818.20		45,261.00
Pipe lines	43,372.95	10,340.28		45,112.71
Oil line, Dock 6 (completed)			86.83	
Oil line, Aton (completed)			292.87	
Oil line, Balboa Road			17,220.82	
Dock No. 4	135,678.93		2,956.82	132,722.11
Cristobal:				
Pumping plant	18,110.93	4,131.12		22,242.05
Storage tanks	41,756.00	9,943.32		51,699.32
Pipe lines	93,767.77	32,922.60		126,690.37
Total	387,540.39	79,041.12	20,557.34	446,024.17
General storehouses; Equipment				
	36,556.11	6,566.59	3,980.88	39,141.73
Motor transportation division:				
Fixed property	8,582.58	2,821.98		11,404.56
Motor vehicles	94,257.78	55,584.46	161,741.26	48,100.98
Total	102,840.36	53,406.44	101,741.26	59,505.54
Motorcar repair shops:				
Fixed property	10,133.33	876.00		11,009.33
Equipment	1,341.22	3,000.20		4,344.42
Total	11,477.55	3,876.20		15,353.75
Building division:				
Fixed property	8,323.13	2,117.00		1,421.57
Pedro Miguel shop (completed)			5,943.43	
Gatun shop (completed)			3,075.13	
Equipment	43,149.92	4,413.90	9,258.32	43,305.50
Total	56,473.05	6,536.90	18,276.88	44,727.07
Panama Canal Press; Equipment				
	33,579.88	3,468.26	6,455.72	30,592.42
Gold quarters:				
Fixed property	9,270.43	156,804.00		11,273.19
Quarters, Gamboa			148,751.32	
House No. 468, Aneon, purchased			3,225.00	
Improvements			15,371.30	
Total	9,270.43	156,804.00	167,347.62	11,273.19
Silver quarters:				
Fixed property	53,097.35	13,997.04		63,100.63
Quarters, Gamboa			3,993.76	
Total	53,097.35	13,997.04	3,993.76	63,100.63
Rented buildings:				
Garages	26,082.84	10,146.21		33,743.8
Additions, Cristobal			2,479.24	
Other rented buildings	3,207.00	2,712.00		5,919.00
Total	29,289.84	12,858.21	2,479.24	39,668.81

Footnotes at end of table.

TABLE No. 27A.—*Funded reserves, fiscal year 1938—Continued*

	Balance July 1, 1937 (adjusted)	Accruals	Expendi- tures	Balance June 30, 1938
District quartermasters' supplies:				
Gasoline stations.....	\$3,634.45	\$2,363.00	-----	\$5,997.45
Gatun Lake pier.....	5,769.08	1,522.30	-----	7,291.38
Mattress factory.....	393.36	-----	-----	393.36
Equipment.....	7,747.49	2,504.40	\$578.43	9,673.46
Total.....	17,544.38	6,389.70	578.43	23,355.65
Farm bureau: Equipment.....	4,216.26	-----	-----	4,216.26
Contingent balance.....	21,550.47	-----	-----	21,550.47
Total, business divisions.....	1,848,857.58	748,932.01	530,438.01	2,067,351.58
Total reserve for replacements.....	2,811,789.76	1,047,967.57	731,421.75	3,128,335.58
Total reserve for repairs (table No. 17).....	545,934.68	860,538.31	931,149.56	475,323.43
Total reserve for leave ² (table No. 18).....	208,471.02	425,237.10	458,170.85	175,537.27
Total, funded reserves (table No. 27).....	3,566,195.46	2,333,742.98	2,120,742.16	3,779,196.28

¹ Indicates overexpenditure.² Less \$250,000.

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